UCLouvain

BIR1BA

2024 - 2025

Bachelor in Bioengineering

BIR1BA - Introduction

Introduction

Introduction

Au terme du premier cycle, vous

- aurez reçu une solide formation scientifique qui contribuera à faire de vous un professionnel capable de s'adapter à toutes les situations ;
- aurez entamé la formation spécialisée qui sera poursuivie au cours du master ;
- vous serez exercé-e à la résolution de problèmes de plus en plus complexes, seul ou en équipe ;
- aurez pris contact avec le milieu professionnel pour aiguiser votre motivation et vous aider à choisir votre parcours de spécialisation en master.

Your profile

Pour aborder les études de bioingénieur, il faut avoir certains goûts : celui des sciences, sans doute, mais aussi celui de se poser des questions. Il faut aimer réfléchir et raisonner, avoir envie de résoudre des problèmes.

Pourvu que vous soyez assidu-e et motivé-e, le nombre d'heures de mathématiques ou de sciences que vous avez suivies dans le secondaire ne sera pas le seul facteur de votre réussite. Une bonne maîtrise du français vous aidera à saisir les nuances de l'énoncé d'un problème ou à mieux comprendre le développement d'une théorie.

Your future job

Une fois bachelier, vous poursuivrez votre formation par un Master en bioingénieur. Quatre masters vous sont proposés : « sciences agronomiques », « chimie et bioindustries », « sciences et technologies de l'environnement » et « gestion des forêts et des espaces naturels ».

Ces masters, qui se déroulent sur deux ans, vous permettront d'acquérir des savoirs approfondis dans une spécialisation de votre choix ainsi que la maîtrise d'outils professionnels en lien avec la discipline, tout en bénéficiant d'une formation polyvalente dans tous les domaines de la bioingéniérie.

Your programme

Le programme de bachelier vous formera aux disciplines de base des sciences du vivant ainsi qu'aux techniques de l'ingénieur. Elles constitueront les piliers indispensables à la formation intégrée de bioingénieur.

Ces disciplines relèvent de cinq domaines principaux qui sont approfondis au cours des trois années :

- mathématiques, analyse et traitement de données,
- sciences et ingénierie de la matière et des procédés,
- sciences de la vie,
- sciences du globe et des écosystèmes,
- sciences humaines.

BIR1BA - Teaching profile

Learning outcomes

Bachelor in Bioengineering students must undertake to gain a good grounding in order to tackle the training provided in the various Masters organised by the Faculty of Biological, Agricultural and Environmental Engineering.

The objective is to develop into individuals working towards a better reconciliation of human activities and respect for the environment,

3.3 To implement a rigorous methodology (experimentation – observation – modelling) allowing the acquisition of data to answer a clearly defined scientific question.

3.4 To master the basics of statistical analysis of scientific data.

3.5 To analyse and interpret the results to produce a reasoned critique on a well-defined scientific question.

3.6 To demonstrate an ability to summarise and formulate conclusions on a well-defined scientific question.

3.7 In each of the skills mentioned above, to demonstrate rigour, precision and the critical thinking essential for any scientific method.

4. To formulate and analyse a simple problem in the agricultural, biological, chemical and environmental engineering fields linked with new situations presenting a degree of uncertainty. To be able to develop pertinent, sustainable and innovative solutions through a systematic and multidisciplinary approach.

This skill set will develop throughout the 5 years. It requires the use of a set of skills as described above. These skills correspond in fact to the different stages of the engineering approach. The majority of these skills are developed in the Bachelor and Master programmes, with differentiation on:

- the complexity and scope of the problem addressed;

- the degree of autonomy demonstrated by the student throughout the process;

- the degree of depth in each skill.

4.1 To extract relevant information to formalise a simple problem, with a view to defining one or more clear questions.

4.2 To identify the key concepts required to resolve the simple problem based on the knowledge acquired.

4.3 To analyse and resolve the simple problem using key concepts and to formulate hypotheses underlying the concepts.

4.5 To identify solutions and the limits of their application based on hypotheses formulated during the resolution stage.

5. To design and implement a multidisciplinary project, alone and in teams with the stakeholders concerned. This project should take the objectives into account and incorporate scientific, technical, environmental, economic and human factors.

The graduate should be able to lead a project alone and in a group, focusing on projects of a scientific and technological nature with highly targeted objectives.

5.1 To know and understand the principles of collaborative learning.

5.2 To plan and develop all the stages of a project alone and in a team based on predefined objectives and work together after having allocated the tasks.

5.3 To contribute to the progress of the project and the success of the team in sharing information and expertise in order to achieve the intended objective.

5.4 To recognise and take into account the diverse viewpoints of team members.

6. To communicate, interact and convince in a professional manner, in French and English (level B2 of the Common European Framework of Reference for Languages published by the Council of Europe), both verbally and in writing, adapting to their conversational partners and the context.

6.1 To understand and use scientific texts and literature and basic technical documents in French and English.

6.2 To communicate information, ideas, solutions and conclusions as well as the knowledge and underlying principles, in a clearly structured, substantiated, concise and comprehensive way (as appropriate) both verbally and in writing according to the standards of communication specific to the context.

6.3 To develop logic diagrams to pose simple questions in summary form.

6.4 To produce graphs, with and without IT equipment, meeting scientific standards.

6.5 To communicate the results of observations and/or experiences in a relevant way using tables and scientific graphs.

6.6 To communicate effectively and respectfully with peers and teachers, demonstrating listening skills, empathy and assertiveness.

6.7 To conduct themselves professional environments with the correct attitude, to interact with players in the field, with colleagues.

6.8 To explain and argue their opinions and views with peers and teachers.

6.9 To learn to use basic software for effective communication in the training activities.

6.10 To learn English to level B2 according to the European Framework.

7. To act with concern for sustainable development challenges, be open to the world and adopt a humanistic outlook.

7.1 To demonstrate intellectual independence of thought, to regard knowledge critically.

7.2 To make decisions and act, on their training path, with respect for ethical values and in compliance with laws and conventions.

7.3 To understand the key issues of sustainable development and to situate their own career in the light of these challenges.

7.4 To demonstrate humanism, cultural openness and solidarity.

8. To demonstrate independence and be proactive in acquiring new knowledge and the development of new skills to be able to adapt to changing or uncertain situations and to develop positively. They will develop a professional project and the course encompasses continuing development.

8.1 To adapt to a variety of learning situations and to take advantage of them.

8.2 To manage their education and work independently: to set priorities, anticipate and plan all their activities in time.

8.3 To manage stress and frustration in the face of undefined or urgent situations.

8.4 To take control of their educational career with the aim of defining the direction of their professional project.

8.5 To integrate new knowledge and skills independently (including methodological skills) in response to defined situations.

Programme structure

This programme which leads to the title of "Bachelor of Engineering Sciences : Bioengineering", is composed of three years of studies. The training programme comprises different types of course activities : lectures, practical exercises, group work, individual work, tutorials, work experience and, of course, personal study.

Each course title is followed by a number indicating the number of hours the course represents per academic year. This number corresponds to lectures, unless a different teaching method (seminars, exercises) is mentioned in the course title. Where course activities (exercises, laboratory work or practical tasks) accompany one or several lectures, these are characterised by a second volume of hours per year. The course timetable is available at the secretary's office of the Faculty.

The number in brackets next to the number of course hours, relates to the total number of credits attributed to the course activity. This unit is a measure of the student's global workload for one year of studies and corresponds to the unit used by the European Credit Transfer System (ECTS). A full study year includes 60 credits. The sign (~) refers to the description of the training activity, available on the web site, when the credits differ for the study years or for the options of the same programme.

Information on credits not indicated on the study programme can be obtained from the secretary's office of the Faculty.

Principal Subjects

- Mathematics, analysis and data-processing
- Sciences and Engineering of Matter and Processes
- Life Sciences
- Earth Sciences and Ecosystems
- Human Sciences

BIR1BA Programme

Detailed programme by subject

- Mandatory
- Optional
- Not offered in 2024-2025
- Not offered in 2024-2025 but offered the following year
- Offered in 2024-2025 but not the following year
- Not offered in 2024-2025 or the following year
- Activity with requisites
- Open to incoming exchange students
- Not open to incoming exchange students
- [FR] Teaching language (FR, EN, ES, NL, DE, ...)

Click on the course title to see detailed informations (objectives, methods, evaluation...)

Major (148 credits)

				Year 1	2	3
Mathematics, data analysis (27 credits)						
LBIR1110	Introduction to analysis	Emmanuel Hanert	[FR] [q1] [30h+30h] [6 Credits]	x		
LBIR1111	Complément d'analyse et d'algèbre	Marino Gran	[FR] [q2] [30h+30h] [6 Credits]	x		
LBIR1211	Analysis of multivariate functions	Emmanuel Hanert	[FR] [q1] [30h+30h] [5 Credits]		x	
LBIR1212	Probabilities and statistics (I)	Patrick Bogaert	[FR] [q1] [30h+15h] [4 Credits]		x	
LBIR1315	Probability and statistics II	Patrick Bogaert	[FR] [q1] [22.5h+22.5h] [3 Credits]			x
LBIR1351	Introduction to systems analysis	Philippe Baret	[FR] [q1] [10h+20h] [3 Credits]			x
Sciences et ingénierie de la matière et des procédés (46 credits)						
LBIR1140	Chimie générale 1	Pierre Delmelle (coord.) Charles-André Fustin Michel Ghislain (coord.)				

Year
1 2 3

LANGL2480	English Communication Skills for Bioengineers	Ahmed Adrioueche Ariane Halleux

				Year 1	2	3
LBIR1340	Basis of quantum mechanics and spectroscopy	Eric Gaigneaux (coord.) Xavier Gonze	FR [q2] [22.5h+22.5h] [3 Credits] *> English-friendly*			x
LBIR1341	Laboratories, seminars and integrated practice of analytical chemistry					

Course prerequisites

The **table** below lists the activities (course units, or CUs) for which there are one or more prerequisites within the programme, i.e. the programme CU for which the learning outcomes must be certified and the corresponding credits awarded by the jury before registering for that CU.

These activities are also identified **in the detailed programme**: their title is followed by a yellow square.

Prerequisites and student's annual programme

As the prerequisite is for CU registration puposes only, there are no prerequisites within a programme year. Prerequisites are defined between CUs of different years and therefore influence the order in which the student will be able to register for the programme's CUs.

In addition, when the jury validates a student's individual programme at the beginning of the year, it ensures its coherence, meaning that it may:

- require the student to combine registration in two separate CUs which it considers necessary from a pedagogical point of view.
- transform a prerequisite into a corequisite if the student is in the final year of a degree course.

For more information, please consult the Academic Regulations and Procedures.

Prerequisities list

LANGL1882 "English : reading and listening comprehension of texts in Bioengineering" has prerequisite(s) LANGL1881

- LANGL1881 - English : reading and listening comprehension of texts in Bioengineering

LANGL2480 "English Communication Skills for Bioengineers" has prerequisite(s) LANGL1882

- LANGL1882 - English : reading and listening comprehension of texts in Bioengineering

LBIR1211 "Analysis of multivariate functions" has prerequisite(s) LBIR1110 AND LBIR1111

- LBIR1110 - Introduction to analysis
- LBIR1111 - Complément d'analyse et d'algèbre

LBIR1212 "Probabilities and statistics (I)" has prerequisite(s) LBIR1111

- LBIR1111 - Complément d'analyse et d'algèbre

LBIR1221 "Wave, optical and modern physics" has prerequisite(s) LBIR1110 AND LBIR1121 AND LBIR1122

- LBIR1110 - Introduction to analysis
- LBIR1121 - General Mechanics
- LBIR1122 - Thermodynamics and Electromagnetism

LBIR1250 "Biochemistry I" has prerequisite(s) LBIR1150 AND LCHM1141B

- LBIR1150 - Cell Biology
- LCHM1141B - Organic chemistry

LBIR1251 "Plant physiology" has prerequisite(s) LBIR1150 AND LBIR1151

- LBIR1150 - Cell Biology
- LBIR1151 - Organismal biology

LBIR1252 "Animal physiology" has prerequisite(s) LBIR1151 AND LCHM1141B

- LBIR1151 - Organismal biology
- LCHM1141B - Organic chemistry

LBIR1260 "Principles of economics" has prerequisite(s) LBIR1110

- LBIR1110 - Introduction to analysis

LBIR1270 "Integrated project in environmental diagnosis" has prerequisite(s) LBIR1130 AND LBIR1170

- LBIR1130 - Introduction to Earth sciences
- LBIR1170 - Projet appliqué en Chimie

LBIR1110 AND LBIR1111
LBIR1271 "Integrated project in programming and applied mathematics" **has prerequisite(s)** has prerequisite(s) LBIR1110 AND LBIR1111

- LBIR1110 - Introduction to analysis

eimihC ne èuqilppa tejorP - LBIR1170 [(•)] TJ /F1 8 Tf 1 0 0 -1 8.39999962 22.63299942 Tm [(•)] TJ /F1 8 Tf 1 0 0 -1 12.80000019 22.91300011 Tm [(LBIR1111)] TJ 1 0 0 -1 48.3

LBIR1336 "Soil science and integrated excursions" has prerequisite(s) LBIR1130 AND LBIR1270

- LBIR1130 - Introduction to Earth sciences
- LBIR1270 - Integrated project in environmental diagnosis

LBIR1340 "Basis of quantum mechanics and spectroscopy" has prerequisite(s) LBIR1211 AND LBIR1221

- LBIR1211 - Analysis of multivariate functions
- LBIR1221 - Wave, optical and modern physics

LBIR1341 "Laboratories, seminars and integrated practice of analytical chemistry" has prerequisite(s) LBIR1212 AND LCHM1211A

- LBIR1212

BIR1BA - 2ND ANNUAL UNIT

- Mandatory
- Optional
- Not offered in 2024-2025
- Not offered in 2024-2025 but offered the following year
- Offered in 2024-2025 but not the following year
- Not offered in 2024-2025 or the following year
- Activity with requisites
- Open to incoming exchange students
- Not open to incoming exchange students
- [FR] Teaching language (FR, EN, ES, NL, DE, ...)

Click on the course title to see detailed informations (objectives, methods, evaluation...)

Major

Mathematics, data analysis

LBIR1211	Analysis of multivariate functions	Emmanuel Hanert	FR [q1] [30h +30h] [5 Credits]
LBIR1212	Probabilities and statistics (I)	Patrick Bogaert	FR [q1] [30h +15h] [4 Credits]

Sciences et ingénierie de la matière et des procédés

LBIR1221	Wave, optical and modern physics	Bruno Bertrand (coord.) Jean-Christophe Charlier	FR [q2] [30h +30h] [5 Credits]
LCHM1211A	Chimie générale 2	Yann Garcia Tom Leyssens	FR [q2] [30h +30h] [5 Credits]
LCHM1244	Organic chemistry 2: deepening of basic concepts	Olivier Riant	FR [q1] [30h +22.5h] [4 Credits]

Life Sciences

LBIR1250	Biochemistry I	Laure-Alix Clerbaux Michel Ghislain (coord.)	FR [q1] [30h +15h] [4 Credits]
LBIR1251	Plant physiology	Xavier Draye (coord.) Stanley Lutts	FR [q2] [30h +30h] [5 Credits]
LBIR1252	Animal physiology	Cathy Debier (coord.) Isabelle Donnay	FR [q2] [30h +30h] [5 Credits]

Sciences du globe et des écosystèmes

LBIR1230	Introduction to biosphere engineering	Philippe Baret Pierre Defourny (coord.) Pierre Delmelle	FR [q2] [60h] [5 Credits]

Human Sciences

LANGL1882	English : reading and listening comprehension of texts in Bioengineering	Amandine Dumont Ariane Halleux Sandrine Meirlaen (coord.) Anne-Julie Toubeau (coord.)	EN [q2] [30h] [2 Credits]

LBIR1260

BIR1BA - 3RD ANNUAL UNIT

- Mandatory
- Optional
- Not offered in 2024-2025
- Not offered in 2024-2025 but offered the following year
- Offered in 2024-2025 but not the following year
- Not offered in 2024-2025 or the following year
- Activity with requisites
- Open to incoming exchange students
- Not open to incoming exchange students
- [FR] Teaching language (FR, EN, ES, NL, DE, ...)

Click on the course title to see detailed informations (objectives, methods, evaluation...)

Major

Mathematics, data analysis

LBIR1315	Probability and statistics II	Patrick Bogaert	FR [q1] [22.5h +22.5h] [3 Credits]
LBIR1351	Introduction to systems analysis	Philippe Baret	FR [q1] [10h +20h] [3 Credits]

Sciences et ingénierie de la matière et des procédés

⊠ LBIR1325B	Transfer of fluids and energy for Bio-engineer	Yann Bartosiewicz Quentin Goor (compensates Mathieu Javaux) Marnik Vanclooster	FR [q2] [0h +30h] [2 Credits]
⊠ LBIR1352P	General genetics *Le cours magistral étant commun, les partims M et P du cours LBIR1352 ne peuvent être cumulés.*	Philippe Baret Annika Gillis Jacques Mahillon	FR [q2] [30h +7.5h] [3 Credits]

Activités au choix libre

The students have a free choice of courses of 10 credits.It's advisable to choose 3 credits within the other options in order to reach 32 credits of the option.

Minimum 10 credit(s)

Minimum 10 credit(s)

BIR1BA - Information

Access Requirements

Decree of 7 November 2013 defining the landscape of higher education and the academic organization of studies.
The admission requirements must be met prior to enrolment in the University.

In the event of the divergence between the different linguistic versions of the present conditions, the French version shall prevail.

SUMMARY

General access requirements

Except as otherwise provided by other specific legal provisions, admission to undergraduate courses leading to the award of a Bachelor's degree will be granted to students with one of the following qualifications :

1. A Certificate of Upper Secondary Education issued during or after the 1993-1994 academic year by an establishment offering full-time secondary education or an adult education centre in the French Community of Belgium and, as the case may be, approved if it was issued by an educational institution before 1 January 2008 or affixed with the seal of the French Community if it was issued after this date, or an equivalent certificate awarded by the Examination Board of the French Community during or after 1994;

2. A Certificate of Upper Secondary Education issued no later than the end of the 1992-1993 academic year, along with official documentation attesting to the student's ability to pursue higher education for students applying for a full-length undergraduate degree programme;

3. A diploma awarded by a higher education institution within the French Community that confers an academic degree issued under the above-mentioned Decree, or a diploma awarded by a university or institution dispensing full-time higher education in accordance with earlier legislation;

4. A higher education certificate or diploma awarded by an adult education centre;

5. A pass certificate for one of the entrance examinations organized by higher education institutions or by an examination board of the French Community; this document gives admission to studies in the sectors, fields or programmes indicated therein;

6. A diploma, certificate of studies or other qualification similar to those mentioned above, issued by the Flemish Community of Belgium, the German Community of Belgium or the Royal Military Academy;

7. A diploma, certificate of studies or other qualification obtained abroad and deemed equivalent to the first four mentioned above by virtue of a law, decree, European directive or international convention;

Note:

Requests for equivalence must be submitted to the Equivalence department (Service des équivalences) of the Ministry of Higher Education and Scientific Research of the French Community of Belgium in compliance with the official deadline.

The following two qualifications are automatically deemed equivalent to the Certificate of Upper Secondary Education (Certificat d'enseignement secondaire supérieur – CESS):

- European Baccalaureate issued by the Board of Governors of a European School,

- International Baccalaureate issued by the International Baccalaureate Office in Geneva.

8. Official documentation attesting to a student's ability to pursue higher education (diplôme d'aptitude à accéder à l'enseignement supérieur - DAES), issued by the Examination Board of the French Community.

Specific access requirements

- Access to bachelor programmes for candidates of nationality outside the European Union who are not assimilated to Belgian nationals is subject to the following criteria:
  - not have obtained a secondary education diploma for more than 3 years maximum. Example: for an admission application for the academic year 2024-2025, you must have obtained your diploma during the academic years 2021-2022, 2022-2023 ou 2023-2024. In the French Community of Belgium, the academic year runs from September 14 to September 13
  - not already hold an undergraduate degree
- Candidates, whatever their nationality, with a secondary school diploma **from a country outside the European Union**, must have obtained an average of 13/20 minimum or, failing that, have obtained this average, have passed one year of study in Belgium (for example special Maths / sciences). A non-successful year will not be taken into consideration.

- For any secondary school diploma **from a European Union country**, the admission request must contain the equivalence of your diploma or, at the very least, proof of the filing of the equivalence request with the Wallonia-Brussels Federation (French Community of Belgium). For any information relating to obtaining an equivalence, please refer to the following site.
- For any secondary school diploma **from a country outside the European Union**, the admission application must contain the equivalence of your diploma issued by the Wallonia-Brussels Federation (French Community of Belgium). If you have a restrictive equivalence for the programme of your choice, in addition of it, you **must** have either the DAES or a certificate of successful completion of the examination giving access to 1st cycle studies when you submit your application

Access based on validation of professional experience

Admission to undergraduate studies on the basis of accreditation of knowledge and skills obtained through professional or personal experience (Accreditation of Prior Experience)

Subject to the general requirements laid down by the authorities of the higher education institution, with the aim of admission to the undergraduate programme, the examination boards accredit the knowledge and skills that students have obtained through their professional or personal experience.

This experience must correspond to at least five years of documented activity, with years spent in higher education being partially taken into account: 60 credits are deemed equivalent to one year of experience, with a maximum of two years being counted. At the end of an assessment procedure organized by the authorities of the higher education institution, the Examination Board will decide whether a student has sufficient skills and knowledge to successfully pursue undergraduate studies.

After this assessment, the Examination Board will determine the additional courses and possible exemptions constituting the supplementary requirements for the student's admission.

Special requirements to access some programmes

- Admission to **undergraduate studies in engineering: civil engineering and architect**

  Pass certificate for the special entrance examination for undergraduate studies in engineering: civil engineering and architect.

  Admission to these courses is always subject to students passing the special entrance examination. Contact the faculty office for the programme content and the examination arrangements.
- Admission to **undergraduate studies in veterinary medicine**

  Admission to undergraduate studies in veterinary medicine is governed by the Decree of 16 June 2006 regulating the number of students in certain higher education undergraduate courses (non-residents).
- Admission to **undergraduate studies in physiotherapy and rehabilitation**

  Admission to undergraduate studies in physiotherapy and rehabilitation is governed by the Decree of 16 June 2006 regulating the number of students in certain higher education undergraduate courses (non-residents).
- Admission to **undergraduate studies in psychology and education: speech and language therapy**

  Admission to undergraduate studies in psychology and education: speech and language therapy is governed by the Decree of 16 June 2006 regulating the number of students in certain higher education undergraduate courses (non-residents).
- Admission to **undergraduate studies in medicine and dental science**

  Admission to undergraduate studies in medecine and dental science is governed by the Decree of 16 June 2006 regulating the