MATH1BA - Teaching profile

Learning outcomes

By the end of the course the student will have acquired the knowledge of the discipline and the transferable skills needed to pursue studies in mathematics or in closely related fields (physics. statistics, actuarial science, computing). This knowledge and skill-set will also be developed by the end of the Master programme in the many and varied contexts and problems that come from other fields (economics and finance, actuarial science, statistics and biostatistics, computing and cryptography, telecommunications, biochemistry and pharmacology, physics and astronomy, climatology and meteorology).

The programme offers a broad education in the fundamental fields of mathematics and an introduction to closely related fields (especially physics, but also statistics, applied mathematics, and computing).

During the Bachelor programme, future graduates in mathematics will be able to bring to bear a critical, constructive and innovative view on the present-day world and its problems. They will have developed their educational and personal plans, which they will pursue during the Master programme with increasing independence.

On successful completion of this programme, each student is able to :

1) recognise and understand a basic foundation of mathematics.

- Choose and use the basic tools of calculation to solve mathematical problems.
- Recognise the fundamental concepts of important current mathematical theories.
- Establish the main connections between these theories, analyse them and explain them through the use of examples.

2) identify, by use of the abstract and experimental approach specific to the exact sciences, the unifying features of different situations and experiments in mathematics or in closely related fields (probability and statistics, physics, computing).

- Follow an abstract reasoning in order to solve problems concerning mathematics and their applications.

3) show evidence of abstract thinking and of a critical spirit.

- Argue within the context of the axiomatic method Recognise the key arguments and the structure of a proof.
- Construct and draw up a proof independently.
- Evaluate the rigour of a mathematical or logical argument and identify any possible flaws in it.
- Distinguish between the intuition and the validity of a result and the different levels of rigorous understanding of this same result.

4) communicate in a clear, precise and rigorous way, in French and in English.

- Write a mathematical text in French according to the conventions of the discipline.
- Structure an oral presentation in French, highlight key elements, identify techniques and concepts and adapt the presentation to the listeners' level of understanding.
- Communicate in English (level C1 for reading comprehension, level B2 for listening comprehension and for oral and written expression, CEFR).

5) learn in an independent manner.

- Find relevant sources in the mathematical literature.
- Read and understand an advanced mathematical text and locate it correctly in relation to knowledge acquired.

Programme structure

The programme leading to the Bachelor in Mathematics is composed of 180 credits spread over three years of study and organised as follows:

- a general education, called the major, of 150 credits;
- a minor of 30 credits.

The major includes the following subjects:

- disciplinary courses: analysis, algebra, geometry;
- courses in closely related disciplines: physics, mechanics, computing and numerical analysis, probability and statistics;
- seminar on mathematical current events and on physics in the first year, review work in the third year;
- introductory courses (one course to be chosen): biology, chemistry, earth sciences, economics;
- human sciences (philosophy and religious studies) and languages.

The first-year programme (60 credits in the major) is identical to that for the first year of Bachelor in Physics. At the end of the first year, there is automatic authorisation for transfer to the Bachelor in Physical Sciences.

In the second and third years, students complete their major programme (50 credits in the second year and 40 credits in the third) either with the additional module minor in mathematics or with another minor to which they have access, chosen on the basis of a project developed in conjunction with their study adviser.

Students who have a degree with more than three years of study, and especially those with a teacher training certificate (upper secondary education), may request personalised admission so as to benefit from a reduced programme. Their programme will be established in conjunction with the study adviser on the basis of the skills the student has already acquired.
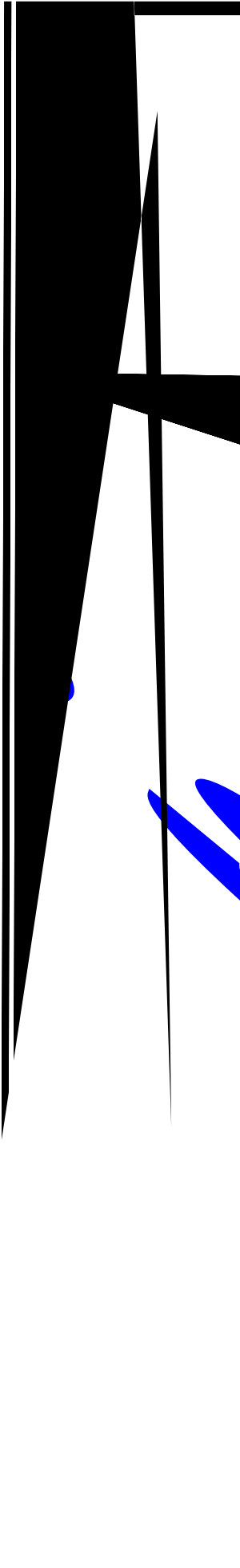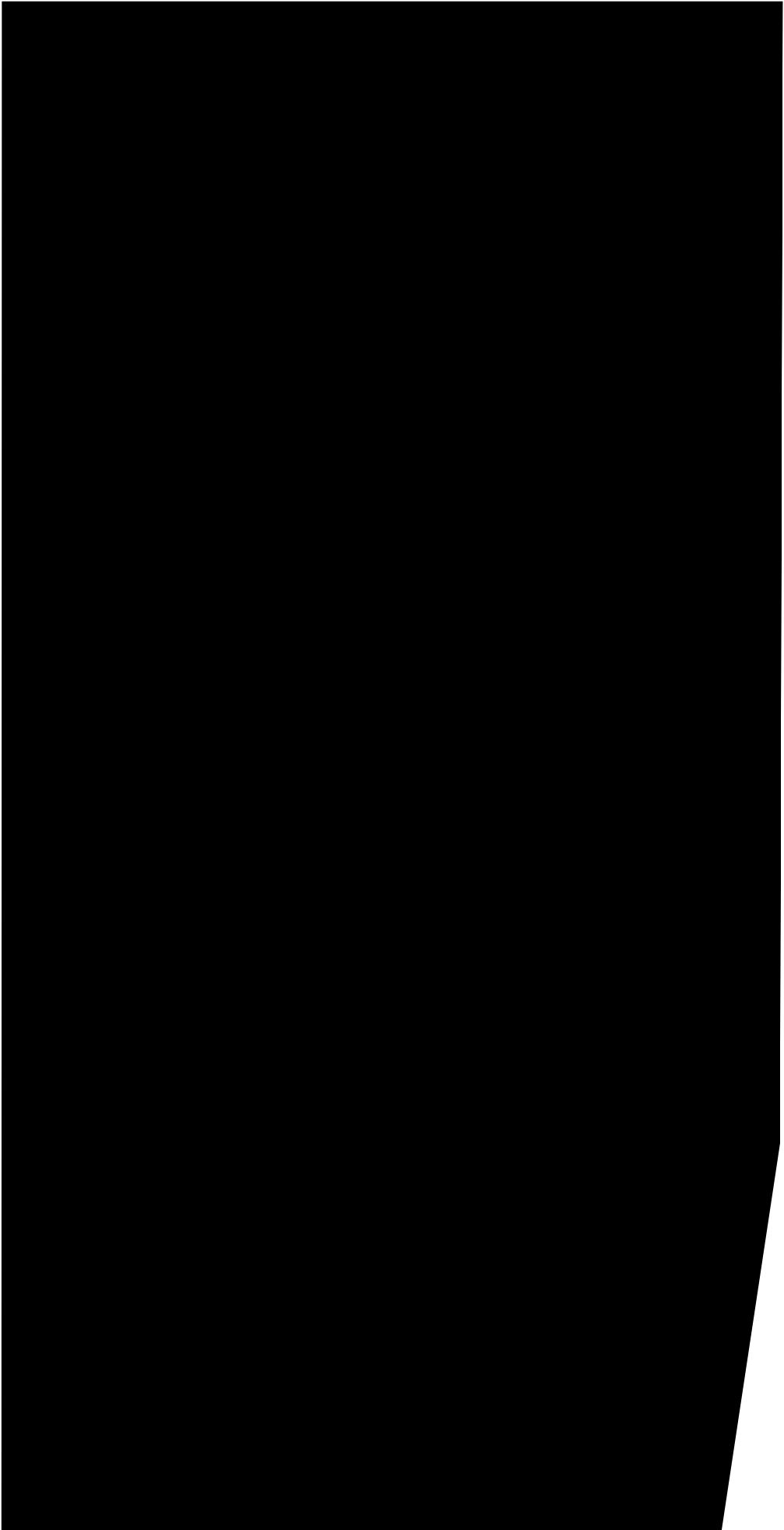
MATH1BA Programme

Detailed programme by subject

O 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]

Year

List of available minors

Students can choose to study certain aspects of their bachelor's degree in greater depth:

- Additional module in mathematics
- Additional module in statistics and data science.

They can also choose to develop their skills in related disciplines:

- Minor in physics
- Minor in applied mathematics
- Minor in computer science
- Access minor to master's degree in economics
- Minor in management ("Initiation")
- Minor in Philosophy

Student choose from the list below of the most commonly programmed minors for mathematicians, or apply for access to one of the UCLouvain minors in the full list (https://uclouvain.be/fr/etudier/mineures.html), taking into account any admission requirements.

> Additionnal module in Mathematics *[en-prog-2024-appmath]*
> Approfondissement en statistique et sciences des données *[en-prog-2024-appstat]*
> Minor in Culture and Creation *[en-prog-2024-mincucrea]*
> Minor in Scientific Culture *[en-prog-2024-mincults]*
> Minor in Development and Environment *[en-prog-2024-mindenv]*
> Minor : Issues of Transition and Sustainable Development (*) *[en-prog-2024-mindd]*
> Minor in Economics *[en-prog-2024-minecon]*
> Minor in Gender Studies *[en-prog-2024-mingenre]*
> Minor in Geography *[en-prog-2024-mingeog]*
> Minor in Mangement (basic knowledge) *[en-prog-2024-minogest]*
> Minor in Computer Sciences *[en-prog-2024-minsinf]*
> Minor in Philosophy *[en-prog-2024-minfilo]*
> Minor in entrepreneurship (*) *[en-prog-2024-minmpme]*
> Minor in Economics (open) *[en-prog-2024-minoeco]*
> Minor in Physics *[en-prog-2024-minphys]*
> Minor in numerical technologies and society *[en-prog-2024-minstic]*
> Minor in Applied Mathematics *[en-prog-2024-lminomap]*

○ Analyse

○ LMAT1121	Diffenrential and integral calculus	Cécile Coyette (compensates Tom Claeys)	FR [q1] [30h +30h] [5 Credits] ⊕
○ LMAT1122	Mathematical analysis : differentiation	Augusto Ponce	FR [q2] [45h +45h] [8 Credits] ⊕

○ Algèbre et géométrie

○ LMAT1131	Linear Algebra	Marino Gran	FR [q1] [45h +45h] [8 Credits] ⊕
○ LMAT1141	Geometry I	Pascal Lambrechts	FR [q2] [45h +30h] [7 Credits] ⊕

○ Physique et physique mathématique

○ LPHYS1111	Mechanics 1	Giacomo Bruno Jan Govaerts	FR [q1] [45h +45h] [8 Credits] ⊕

○ Analyse numérique et Informatique

○ LINFO1101	Introduction to programming	Kim Mens Siegfried Nijssen Charles Pecheur	FR [q1] [30h +30h] [6 Credits] ⊕

○ Probabilités et statistiques

○ LMAFY1101	Data exploration and introduction to statiscal inference	Anouar El Ghouch	FR [q2] [30h +30h] [5 Credits] ⊕

○ Anglais

○ LANG1861	English: reading and listening comprehension of scientific texts	Catherine Avery (coord.) Fanny Desterbecq Amandine Dumont (coord.) Marc Piwnik	EN [q2] [10h] [3 Credits] ⊕

○ Cours au choix

L'étudiant·e choisit une UE parmi

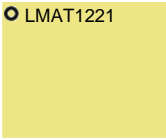|			
⋇ LBIO1110	Life : diversity and evolution	Patrick Dumont	FR [q1] [30h +10h] [5 Credits] ⊕
⋇ LCHM1112	General Chemistry	Yaroslav Filinchuk	FR [q1] [30h +22.5h] [5 Credits] ⊕
⋇ LECGE1115	Political Economics	Rigas Oikonomou Gonzague Vannoorenberghe	FR [q1] [45h +15h] [5 Credits] ⊕
⋇ LGEO1111	Earth and society : perspectives from geography	Marie Scouvart (compensates Eric Lambin)	FR [q2] [30h +15h] [5 Credits] ⊕
⋇ LPHYS1113	Mechanics 2	Vincent Lemaitre	FR [q2] [30h +25h] [5 Credits] ⊕

MATH1BA - 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...)

⦿ *Majeure*

⦿ **Analyse**

⦿ LMAT1221

MATH1BA - 3RD ANNUAL UNIT

O 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...)

o *Majeure*

o **Analyse**

O LMAT1321	Functional analysis and partial differential equations	Jean Van Schaftingen	[EN] [q1] [45h +45h] [7 Credits] 🌐 > *English-friendly*

o **Analyse numérique et Informatique**

O LMAT1351	Approximation: methods et theory	Tom Claeys	[EN] [q1] [30h +30h] [5 Credits] 🌐 > *French-friendly*

o **Probabilités et statistiques**

⚅ LTECO2300	Societies, cultures, religions : Ethical questions	Marcela Lobo Bustamante	FR [q1] [15h] [2 Credits] 🌐

○ Bloc au choix

L'étudiant complète son programme en choisissant des cours des 2 blocs suivants (il est conseillé à l'étudiant de s'inscrire à au moins 10 crédits par bloc annuel). Cependant, avoir suivi tous les cours du bloc Statistique et Informatique est recommandé si vous souhaitez vous inscrire au master en science des données, orientation statistique.

⚅ Bloc Mathématique

⚅ LMAT1223	Differential equations	Heiner Olbermann	FR [q2] [30h +15h] [5 Credits] 🌐 > *English-friendly*
⚅ LMAT1322	Real and harmonic analysis	Augusto Ponce	FR [q2] [30h +30h] [5 Credits] 🌐 > *English-friendly*
⚅ LMAT1342	Geometry 3	Pascal Lambrechts	FR [q1] [30h +30h] [5 Credits] 🌐 > *English-friendly*
⚅ LMAT1331	Commutative algebra	Enrico Vitale	FR [q1] [30h +15h] [5 Credits] 🌐
⚅ LMAT1361	Galois Theory	Pierre-Emmanuel Caprace	FR [q2] [30h +15h] [5 Credits] 🌐

⚅ Bloc Statistique et Informatique

A l'exception de LINFO1103 et LINFO1123, il est recommandé de suivre LEPL1402 avant les autres cours de la liste ci-dessous :

⚅ LINFO1123	Calculability, Logic and Complexity	Yves Deville	FR [q2] [30h +30h] [5 Credits] 🌐
⚅ LINFO1121	Algorithms and data structures 🟨	Pierre Schaus	FR [q1] [30h +30h] [5 Credits] 🌐

⚅ Cours au choix

L'étudiant choisit un des deux cours suivants :

⚅ LINGE1222	Multivariate Statistical Analysis 🟨	Antoine Soetewey	FR [q2] [30h +15h] [4 Credits] 🌐
⚅ LBIRA2110A	Statistical analysis of multivariate data - Biometrics 1	Xavier Draye Frédéric Gaspart Laura Symul	FR [q1] [22.5h +15h] [4 Credits] 🌐 > *English-friendly*

⚅ Optional courses

These credits are not counted within the 120 required credits.

⚅ LSST1001	IngénieuxSud	Stéphanie Merle Jean-Pierre Raskin	FR [q1+q2] [15h +45h] [5 Credits] 🌐
⚅ LSST1002M	Information and critical thinking - MOOC	Myriam De Kesel	FR [q2] [30h +15h] [3 Credits] 🌐

✿ *Minor or additional module*

L'étudiant complète sa formation en choisissant un approfondissement ou une mineure dans la liste proposée pour le bachelier en sciences mathématiques. Il répartit les unités d'enseignement dans le 2e et le 3e bloc annuel, de manière à ce que son programme annuel totalise 60 crédits.
Maximum 1 element(s)

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MATH1BA - Information

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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
- Specific access requirements
- Access based on validation of professional experience
- Special requirements to access some programmes

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 number of students in certain higher education undergraduate courses (non-residents).

  Note: students wishing to enrol for a **Bachelor's degree in Medicine** or a **Bachelor's degree in dental science** must first sit an aptitude test (fr).

Faculty	Faculty of Science (SC)
Sector	Sciences and Technology (SST)
Acronym	MATH
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