MATH1BA

2023 - 2024

Bachelor in Mathematics

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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.

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MATH1BA Programme

Detailed programme by subject

○ Mandatory
⊗ Optional
△ Not offered in 2023-2024
⊘ Not offered in 2023-2024 but offered the following year
⊕ Offered in 2023-2024 but not the following year
△ ⊕ Not offered in 2023-2024 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...)

Year
1 2 3

○

List of available minors

Students will choose the additional module minor in mathematics or another introductory and/or access minor arranged by the University.

> Minor in Culture and Creation   *[en-prog-2023-mincucrea]*
> Minor in Scientific Culture   *[en-prog-2023-mincults]*
> Minor in Development and Environment   *[en-prog-2023-mindenv]*
> Minor : Issues of Transition and Sustainable Development (*)   *[en-prog-2023-mindd]*
> Minor in Economics   *[en-prog-2023-minecon]*
> Minor in Gender Studies   *[en-prog-2023-mingenre]*
> Minor in Geography   *[en-prog-2023-mingeog]*
> Minor in Mangement (basic knowledge)   *[en-prog-2023-minogest]*
> Minor in Computer Sciences   *[en-prog-2023-minsinf]*
> Minor in Philosophy   *[en-prog-2023-minfilo]*
> Additionnal module in Mathematics   *[en-prog-2023-appmath]*
> Minor in entrepreneurship (*)   *[en-prog-2023-minmpme]*
> Minor in Economics (open)   *[en-prog-2023-minoeco]*
> Minor in Physics   *[en-prog-2023-minphys]*
> Approfondissement en statistique et sciences des données   *[en-prog-2023-appstat]*
> Minor in numerical technologies and society   *[en-prog-2023-minstic]*
> Minor in Applied Mathematics   *[en-prog-2023-lminomap]*
> Minor in Mechanics   *[en-prog-2023-lminomeca]*
> Mineure Polytechnique   *[en-prog-2023-minpoly]*

(*) This programme is the subject of access criteria

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.

❍ Sciences humaines

❍ Philosophie
L'étudiant choisit
From 2 to 4 credit(s)

✸ LSC1120A	Philosophy	Charles Pence	FR [q1] [45h] [2 Credits] 🌐
✸ LFILO1250A	Logic (partim)	Peter Verdée	FR [q2] [45h] [4 Credits] 🌐 *> English-friendly*

❍ 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

✸ LMAT1261	Lagrangian and Hamiltonian mechanics	Christian Walmsley Hagendorf	FR [q1] [22.5h +30h] [5 Credits] 🌐 *> English-friendly*
✸ LMAT1323	Topology	Pedro Dos Santos Santana Forte Vaz	FR [q1] [30h +15h] [5 Credits] 🌐 *> English-friendly*

✸

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✿ *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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Maximum 1 element(s)

MATH1BA - 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
- 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 (https://uclouvain.be/fr/etudier/inscriptions/examens-admission.html) 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.

- 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 (https://uclouvain.be/fr/facultes/epl/examenadmission.html).

  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) (https://uclouvain.be/en/study/inscriptions/etudes-contingentees.html).
- 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). (https://uclouvain.be/en/study/inscriptions/etudes-contingentees.html)
- 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) (https://uclouvain.be/en/study/inscriptions/etudes-contingentees.html).
- 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). (https://uclouvain.be/en/study/inscriptions/etudes-contingentees.html)

  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) (https://uclouvain.be/en/study/inscriptions/etudes-contingentees.html).

Teaching method

Whenever possible, teachers in the School of Mathematics give priority to close supervision: small-group work, individual tuition, rapid and personalised feedback on activities, active participation of students in the School's teaching decisions. All the courses in the programme contribute to the acquisition of skills such as the capacity for abstract thinking and for reasoning. Other skills (aptitude for communication, independent learning, document research) are especially exercised in the third-year review work.

In the first year, tutorial sessions allow those students who wish to do so to take stock of topics considered in the course in a personalised way with the help of teachers. The Faculty also holds sessions on the issue of working methods as well as on ways of approaching different subjects and on time management.

For the three years, exercise sessions and laboratory sessions are held in small groups accompanied by assistants. Individual and/or group work is expected for some activities, especially in the third-year review work, with the help of assistants or teachers. Internet sites (the iCampus platform) are linked to most courses: they contain useful information as well as syllabi and other documents vital for students' work.

Evaluation

The evaluation methods comply with the <u>regulations concerning studies and exams</u> (https://uclouvain.be/fr/decouvrir/ rgee.html). More detailed explanation of the modalities specific to each learning unit are available on their description sheets under the heading "Learning outcomes evaluation method".

Assessment methods conform to academic regulations and procedures. More details on the methods employed in each teaching unit are available in their description sheet, under the heading 'Assessment methods for student learning'.

Different methods are in place in order to evaluate the knowledge and skills acquired in the course of the learning period; these are adapted to the following types of performance: continuous assessment, especially for practical exercises; assessment of personal work (reading, consultation of databases and bibliographical references, monograph and report writing); overall assessment (written and/or oral) during examination sessions; assessment of public presentations.

In the first year, compulsory tests contributing to the final mark for each subject are held one month after the beginning of classes in the first semester.

Mobility and/or Internationalisation outlook

International mobility is recommended rather within the framework of master programmes. In special cases, however, it is possible to consider international mobility at the end of the bachelor's degree.

Moreover, participation in a short mobility can be envisaged at the end of the bachelor's degree in the framework of the Athens network https://www.paristech.fr/fr/international/europe/athens

Possible trainings at the end of the programme

Whatever the minor or course blocks selected, the Bachelor in Mathematics allows access to the following programmes:

- Master [120] in Mathematics, research or teaching focus;
- Master [60] in Mathematics;
- Master [120] in Actuarial Science;
- Master [120] in Data Science : Statistic

It also provides access through additional training or the choice of a appropriate minor to the programs:

- Master [120] in Statistics: General
- Master [120] in Statistics: Biostatistics

Contacts

Curriculum Management

Entity

Structure entity	SST/SC/MATH
Denomination	(MATH)
Faculty	Faculty of Science (SC)
Sector	Sciences and Technology (SST)
Acronym	MATH
Postal address	Chemin du Cyclotron 2 - bte L7.01.02
	1348 Louvain-la-Neuve
	Tel: +32 (0) 10 47 31 52 - Fax: +32 (0) 10 47 25 30
Website	https://uclouvain.be/fr/facultes/sc/math

Academic supervisor: Jean Van Schaftingen (https://uclouvain.be/repertoires/jean.vanschaftingen)

Jury

- President: Tim Van der Linden (https://uclouvain.be/repertoires/tim.vanderlinden)
- Secretary and Study advisor: Pierre Bieliavsky (https://uclouvain.be/repertoires/pierre.bieliavsky)

Useful Contact(s)

- Administrative manager for the student's annual program: Nathalie Micha (https://uclouvain.be/repertoires/nathalie.micha)
- Secretary of the School of mathematics: Catherine De Roy (https://uclouvain.be/repertoires/catherine.deroy)