UCLouvain

MATH1BA

2021 - 2022

Bachelor in Mathematics

At Louvain-la-Neuve - 180 credits - 3 years - Day schedule - In French
Dissertation/Graduation Project : **NO** - Internship : **NO**
Activities in English: **YES** - Activities in other languages : **NO**
Activities on other sites : **NO**
Main study domain : **Sciences**
Organized by: **Faculty of Science (SC)**
Programme acronym: **MATH1BA** - Francophone Certification Framework: 6

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MATH1BA - Introduction

Introduction

Introduction

The Bachelor's in Mathematics offers:

- a basic training in algebra, geometry, analysis and physics;
- an introduction to more advanced topics: complex analysis, differential equations, differential geometry, measure theory, group theory, multilinear and commutative algebra, etc.;
- teaching which opens the way to applied mathematics: numerical and computational methods, probability and statistics, mechanics, etc.;
- progressive learning and a programme which leaves time for high-quality personal work;
- close and high-quality supervision: supervised exercises, laboratory exercises, group and individual work, tutorial sessions;
- the opportunity to carry out a first personal research project under the supervision of a teacher.

Your profile

You :

- love mathematics and have a sense of the precision and rigour of reasoning
- wish to develop your analytical skills and apply your capacity for reasoning and your spirit of abstraction in order to understand, model and solve complex situations in every field of application of mathematics;
- are committed to research and hope to carry out a first project in collaboration with internationally renowned researchers;
- plan to teach mathematics in secondary school and wish to acquire a solid training in fundamental mathematics

Your future job

Training in mathematics aims to master advanced mathematical tools and to develop skills such as the capacity for abstract thinking, the analysis and modelling of complex situations, the sense of precision and of rigour in reasoning, and aptitude for communication. These skills can prove invaluable in fundamental mathematical research, in teaching mathematics, as well as in many other professions where mathematics interacts with other disciplines such as physics, chemistry, biology, pharmacology, climatology, meteorology, astronomy, computing, cryptography, statistics and biostatistics, telecommunications, finance, actuarial science, etc.

Your programme

The programme for the Bachelor in Mathematics is composed of 180 credits spread over three years. It is formed of general training (150 credits) and of an additional module minor or a minor introducing other fields (30 credits).

The first-year programme (60 credits in the major) is identical to the first-year programme for Bachelor in Physics, thus allowing transfer to this programme.

By the end of the course the student will have acquired the disciplinary foundations needed to pursue studies in mathematics or in closely related fields (physics. statistics, actuarial science, computing).

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

- Mandatory
- Optional
- Not offered in 2021-2022
- Not offered in 2021-2022 but offered the following year
- Offered in 2021-2022 but not the following year
- Not offered in 2021-2022 or the following year
- Activity with requisites
- [FR] Teaching language (FR, EN, ES, NL, DE, ...)

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

Majeure (150 credits)

				Year 1	2	3
Methodology (5 credits)						
LMAT1191	Introduction to the mathematical approach	Pierre-Emmanuel Caprace Jean Van Schaftingen	FR [q1+q2] [30h+30h] [5 Credits]	x		
Analyse (30 credits)						
LMAT1121	Diffenrential and integral calculus	Tom Claeys	FR [q1] [30h+30h] [5 Credits]	x		
LMAT1122	Mathematical analysis : differentiation	Augusto Ponce	FR [q2] [45h+45h] [8 Credits]	x		
LMAT1221	Mathematical analysis : integration	Heiner Olbermann	FR [q1] [30h+30h] [5 Credits]		x	
LMAT1222	Complex analysis 1	Tom Claeys	FR [q2] [30h+15h] [5 Credits]		x	
LMAT1321	Functional analysis and partial differential equations	Jean Van Schaftingen	FR [q1] [45h+45h] [7 Credits]			x
Algèbre et géométrie (26 credits)						
LMAT1131	Linear Algebra	Marino Gran	FR [q1] [45h+45h] [8 Credits]	x		
LMAT1231	Multilinear algebra and group theory	Pierre-Emmanuel Caprace	EN [q1] [30h+30h] [5 Credits]		x	
LMAT1141	Geometry I	Pascal Lambrechts	FR [q2] [45h+30h] [7 Credits]	x		
LMAT1241	Geometry II	Pierre Bieliavsky	FR [q2] [45h+30h] [6 Credits]		x	
Physique et physique mathématique (8 credits)						
LPHYS1111	Mechanics 1	Jan Govaerts	FR [q1] [45h+45h] [8 Credits]	x		
Analyse numérique et Informatique (16 credits)						
LINFO1101	Introduction to programming	Kim Mens Siegfried Nijssen Charles Pecheur	FR [q1] [30h+30h] [6 Credits]	x		
LMAT1151	Numerical analysis : tools and software of calculus	Jean Van Schaftingen	FR [q1] [30h+45h] [5 Credits]		x	
LMAT1351	Approximations : methods et theory	Tom Claeys	FR [q1] [30h+30h] [5 Credits]			x
Probabilités et statistiques (16 credits)						
LMAFY1101	Data exploration and introduction to statiscal inference	Anouar El Ghouch	FR [q2] [30h+30h] [5 Credits]	x		
LMAT1271	Calculation of probability and statistical analysis	Rainer von Sachs	FR [q2] [30h+30h] [6 Credits]		x	
LMAT1371	Probability Theory	Johan Segers	FR [q2] [30h+22.5h] [5 Credits]			x

Séminaires et travaux de synthèse (6 credits)

				Year 1	2	3
LMAT1381	Personal project and seminary	Pedro Dos Santos Santana Forte Vaz Augusto Ponce	FR [q2] [30h] [6 Credits]			x

Anglais (9 credits)

LANG1861	English: reading and listening comprehension of scientific texts	Fanny Desterbecq (coord.) Amandine Dumont (coord.) Marc Piwnik	EN [q2] [10h] [3 Credits]	x		
LANG1862	English: reading and listening comprehension of scientific texts	Ahmed Adrioueche (coord.) Catherine Avery Amandine Dumont Ariane Halleux (coord.) Adrien Kefer (compensates Laura Lievens)	EN [q1] [30h] [3 Credits]		x	
LANG1863	English for Students in Sciences (Upper-Intermediate level)	Ahmed Adrioueche (coord.) Catherine Avery (coord.) Amandine Dumont (coord.) Sandrine Jacob (coord.) Hila Peer Nevin Serbest Colleen Starrs Françoise Stas (coord.)	EN [q1 or q2] [30h] [3 Credits]			x

Cours au choix (5 credits)

L'étudiant·e choisit une UE parmi

LBIO1110	Life : diversity and evolution	Patrick Dumont Caroline Nieberding	FR [q1] [30h+10h] [5 Credits]	x		
LCHM1112	General Chemistry	Yaroslav Filinchuk	FR [q1] [30h+22.5h] [5 Credits]	x		
LECGE1115	Political Economics	Rigas Oikonomou Gonzague Vannoorenberghe	FR [q1] [45h+15h] [5 Credits]	x		
LGEO1111	Earth and society : perspectives from geography	Marie-Laurence De Keersmaecker Bas van Wesemael	FR [q2] [30h+15h] [5 Credits]	x		
LPHYS1112A	Mechanics 2 and thermodynamics : Mechanics 2	Thierry Fichefet Vincent Lemaitre	FR [q2] [30h+22.5h] [5 Credits]	x		

Sciences humaines

Philosophie

L'étudiant choisit

From 2 to 4credit(s)

LSC1120A	Philosophy	Alexandre Guay	FR [q1] [30h] [2 Credits]		x	
LFILO1250A	Logic (partim)	Peter Verdée	FR [q2] [45h] [4 Credits]		x	

Sciences religieuses (2 credits)

Students choose 2 credits from the following courses

LTECO2100	Sociétés, cultures, religions : Biblical readings	Hans Ausloos	FR [q1] [15h] [2 Credits]			x
LTECO2200	Societies-cultures-religions : Human Questions	Sébastien Dehorter (compensates Régis Burnet) Dominique Martens	FR [q1 or q2] [15h] [2 Credits]			x
LTECO2300	Societies, cultures, religions : Ethical questions	Marcela Lobo Bustamante	FR [q1] [15h] [2 Credits]			x

Year
1 2 3

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]			x
LMAT1261	Lagrangian and Hamiltonian mechanics	Christian Walmsley Hagendorf	FR [q1] [22.5h+30h] [5 Credits]		x	
LMAT1323	Topology	Pedro Dos Santos Santana Forte Vaz	FR [q1] [30h+15h] [5 Credits]		x	
LMAT1322	Real and harmonic analysis	Augusto Ponce	FR [q2] [30h+30h] [5 Credits]			x
LMAT1342	Geometry 3	Pascal Lambrechts	FR [q1] [30h+30h] [5 Credits]			x
LMAT1331	Commutative algebra	Marino Gran Pierre-Alain Jacqmin (compensates Marino Gran)	FR [q2] [30h+15h] [5 Credits]			x
LMAT1361	Galois Theory	Pierre-Emmanuel Caprace	FR [q1] [30h+15h] [5 Credits]			x

Bloc Statistique et Informatique

A l'exception de LINFO1103, il est recommandé de suivre LINFO1101 avant les autres cours de la liste ci-dessous :

LINFO1103	Introduction to algorithms	Pierre Dupont	FR [q2] [30h+30h] [5 Credits]		x	
LEPL1402	Informatics 2	Sébastien Jodogne Ramin Sadre Pierre Schaus	FR [q1] [30h+30h] [6 Credits]		x	
LINMA1702	Optimization models and methods I	François Glineur	FR [q2] [30h+22.5h] [5 Credits]		x	
LINFO1123	Calculability, Logic and Complexity	Yves Deville	FR [q2] [30h+30h] [5 Credits]			x
LINFO1121	Algorithms and data structures	Pierre Schaus	FR [q1] [30h+30h] [5 Credits]			x

Cours au choix

L'étudiant choisit un des deux cours suivants :

LINGE1222	Multivariate Statistical Analysis	Nathan Uyttendaele (compensates Johan Segers)	FR [q2] [30h+15h] [4 Credits]			x
LBIRA2110A	Modélisation et exploration des données multivariées - Biométrie	Xavier Draye Frédéric Gaspart Bernadette Govaerts	FR [q1] [30h+15h] [4 Credits]			x

Optional courses

These credits are not counted within the 120 required credits.

LSST1001	IngénieuxSud	Stéphanie Merle Jean-Pierre Raskin (coord.)	FR [q1+q2] [15h+45h] [5 Credits]			x
LSST1002M	Information and critical thinking - MOOC	Myriam De Kesel Jean-François Rees	FR [q2] [30h+15h] [3 Credits]			x

Minor or additional module (30 credits)

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.

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 Law (access) *[en-prog-2021-minadroi]*
> Minor in Antiquity: Egypt, Eastern World, Greece, Rome *[en-prog-2021-minanti]*
> Minor in Urban Architecture *[en-prog-2021-minarch]*
> Minor in History of Art and Archeology *[en-prog-2021-minarke]*
> Minor in Chinese studies *[en-prog-2021-minchin]*
> Minor in Information and Communication *[en-prog-2021-mincomu]*
> Minor in Culture and Creation *[en-prog-2021-mincucrea]*
> Minor in Scientific Culture *[en-prog-2021-mincults]*
> Minor in Development and Environment *[en-prog-2021-mindenv]*
> Minor in Sustainable Development (*) *[en-prog-2021-mindd]*
> Minor in Economics *[en-prog-2021-minecon]*
> Minor in European Studies *[en-prog-2021-mineuro]*
> Minor in French Studies (*) *[en-prog-2021-minfran]*
> Minor in Engineering Sciences : biomedical (only available for reenrolment) *[en-prog-2021-mingbio]*
> Minor in Gender Studies *[en-prog-2021-mingenre]*
> Minor in Geography *[en-prog-2021-mingeog]*
> Minor in Mangement (basic knowledge) *[en-prog-2021-minogest]*
> Minor in History *[en-prog-2021-minhist]*
> Minor in Human and Social Sciences *[en-prog-2021-minhuso]*
> Minor in Computer Sciences *[en-prog-2021-minsinf]*
> Minor in Arabic language and Islamic civilization *[en-prog-2021-minislam]*
> Minor in Philosophy *[en-prog-2021-minfilo]*
> Minor in Linguistics *[en-prog-2021-minling]*
> Minor in Literary Studies *[en-prog-2021-minlitt]*
> Minor in Engineering Sciences: Applied Mathematics (only available for reenrolment) *[en-prog-2021-minmap]*
> Additionnal module in Mathematics *[en-prog-2021-appmath]*
> Minor in Medieval Studies *[en-prog-2021-minmedi]*
> Minor in entrepreneurship (*) *[en-prog-2021-minmpme]*
> Minor in Musicology *[en-prog-2021-minmusi]*
> Minor in Law (openness) *[en-prog-2021-minodroi]*
> Minor in Economics (open) *[en-prog-2021-minoeco]*
> Minor in Oriental Studies *[en-prog-2021-minori]*
> Minor in Physics *[en-prog-2021-minphys]*
> Minor in Sciences of Religions (openness) *[en-prog-2021-minreli]*
> Minor in Sociology and Anthropology *[en-prog-2021-minsoca]*
> Minor in Population and Development Studies *[en-prog-2021-minsped]*
> Minor in Political Sciences *[en-prog-2021-minspol]*
> Minor in Statistics, Actuarial Sciences and Data Sciences *[en-prog-2021-minstat]*
> Approfondissement en statistique et sciences des données *[en-prog-2021-appstat]*
> Minor in numerical technologies and society *[en-prog-2021-minstic]*
> Minor in Christian Theology *[en-prog-2021-mintheo]*
> Minor in Biomedicine (openness) *[en-prog-2021-minsbim]*
> Minor in Applied Mathematics *[en-prog-2021-lminomap]*
> Minor in Biomedical Engineering *[en-prog-2021-lminogbio]*
> Minor in Mechanics *[en-prog-2021-lminomeca]*

(*) 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.

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:

- transform a prerequisite into a corequisite within the same year (to enable the student to continue his or her studies with a sufficient annual course load)
- require the student to combine registration in two separate CUs which it considers necessary from a pedagogical point of view.

For more information, please consult the Academic Regulations and Procedures (https://uclouvain.be/fr/decouvrir/rgee.html).

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 # Prerequisities list

LANG1862 "English: reading and listening comprehension of scientific texts" has prerequisite(s) LANG1861
- LANG1861 - English: reading and listening comprehension of scientific texts

LANG1863 "Anglais interactif pour étudiants en sciences (niveau intermédiaire+)" has prerequisite(s) LANG1862
- LANG1862 - English: reading and listening comprehension of scientific texts

LBIRA2110A "Modélisation et exploration des données multivariées - Biométrie" has prerequisite(s) LMAT1271
- LMAT1271 - Calculation of probability and statistical analysis

LEPL1402 "Informatique 2" has prerequisite(s) LINFO1101
- LINFO1101 - Introduction to programming

LINFO1121 "Algorithmique et structures de données" has prerequisite(s) LEPL1402
- LEPL1402 - Informatics 2

LINFO1123 "Calculabilité, logique et complexité" has prerequisite(s) LINFO1101
- LINFO1101 - Introduction to programming

LINGE1222 "Analyse statistique multivariée" has prerequisite(s) LMAT1271
- LMAT1271 - Calculation of probability and statistical analysis

LINMA1702 "Modèles et méthodes d'optimisation I" has prerequisite(s) LINFO1101
- LINFO1101 - Introduction to programming

LMAT1221 "Analyse mathématique : intégration" has prerequisite(s) LMAT1122
- LMAT1122 - Mathematical analysis : differentiation

LMAT1222 "Analyse complexe 1" has prerequisite(s) LMAT1121
- LMAT1121 - Diffenrential and integral calculus

LMAT1223 "Equations différentielles ordinaires" has prerequisite(s) LMAT1121 ET LMAT1122 ET LMAT1131
- LMAT1121 - Diffenrential and integral calculus
- LMAT1122 - Mathematical analysis : differentiation
- LMAT1131 - Linear Algebra

LMAT1231 "Multilinear algebra and group theory" has prerequisite(s) LMAT1131
- LMAT1131 - Linear Algebra

LMAT1241 "Géométrie 2" has prerequisite(s) LMAT1121 ET LMAT1141 ET LMAT1131
- LMAT1121 - Diffenrential and integral calculus
- LMAT1141 - Geometry I
- LMAT1131 - Linear Algebra

LMAT1261 "Mécanique lagrangienne et hamiltonienne" has prerequisite(s) LMAT1121
- LMAT1121 - Diffenrential and integral calculus

LMAT1271 "Calcul des probabilités et analyse statistique" has prerequisite(s) LMAT1121 ET LMAFY1101
- LMAT1121 - Diffenrential and integral calculus
- LMAFY1101 - Data exploration and introduction to statiscal inference

LMAT1321 "Analyse fonctionnelle et équations aux dérivées partielles" has prerequisite(s) LMAT1122 ET LMAT1131 ET LMAT1221
- LMAT1122 - Mathematical analysis : differentiation
- LMAT1131 - Linear Algebra
- LMAT1221 - Mathematical analysis : integration

LMAT1322 "Analyse réelle et harmonique" has prerequisite(s) LMAT1121 ET LMAT1122 ET LMAT1221
- LMAT1121 - Diffenrential and integral calculus

- LMAT1122 - Mathematical analysis : differentiation
- LMAT1221 - Mathematical analysis : integration

LMAT1323 "Topologie" has prerequisite(s) LMAT1122

- LMAT1122 - Mathematical analysis : differentiation

LMAT1331 "Algèbre commutative" has prerequisite(s) LMAT1131

- LMAT1131 - Linear Algebra

LMAT1342 "Géométrie 3" has prerequisite(s) LMAT1141 ET LMAT1241

- LMAT1141 - Geometry I
- LMAT1241 - Geometry II

LMAT1371 "Théorie des probabilités" has prerequisite(s) LMAT1271

- LMAT1271 - Calculation of probability and statistical analysis

LMAT1381 "Projet personnel et séminaire" has prerequisite(s) LMAT1221 ET LMAT1222 ET LMAT1231 ET LMAT1241

- LMAT1221 - Mathematical analysis : integration
- LMAT1222 - Complex analysis 1
- LMAT1231 - Multilinear algebra and group theory
- LMAT1241 - Geometry II

The programme's courses and learning outcomes

For each UCLouvain training programme, a reference framework of learning outcomes specifies the the skills expected of every graduate on completion of the programme. Course unit descriptions specify targeted learning outcomes, as well as the unit's contribution to reference framework of learning outcomes.

Detailed programme per annual block

MATH1BA - 1ST ANNUAL UNIT

- Mandatory
- Optional
- Not offered in 2021-2022
- Not offered in 2021-2022 but offered the following year
- Offered in 2021-2022 but not the following year
- Not offered in 2021-2022 or the following year
- Activity with requisites
- [FR] Teaching language (FR, EN, ES, NL, DE, ...)

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

Majeure

Methodology

LMAT1191	Introduction to the mathematical approach	Pierre-Emmanuel Caprace Jean Van Schaftingen	FR [q1+q2] [30h+30h] [5 Credits]

Analyse

LMAT1121	Diffenrential and integral calculus	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	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	Fanny Desterbecq (coord.) 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 Caroline Nieberding	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-Laurence De Keersmaecker Bas van Wesemael	FR [q2] [30h+15h] [5 Credits]
LPHYS1112A	Mechanics 2 and thermodynamics : Mechanics 2	Thierry Fichefet Vincent Lemaitre	FR [q2] [30h +22.5h] [5 Credits]

MATH1BA - 2ND ANNUAL UNIT

- Mandatory
- Optional
- Not offered in 2021-2022
- Not offered in 2021-2022 but offered the following year
- Offered in 2021-2022 but not the following year
- Not offered in 2021-2022 or the following year
- Activity with requisites
- [FR] Teaching language (FR, EN, ES, NL, DE, ...)

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

Majeure

Analyse

LMAT1221	Mathematical analysis : integration	Heiner Olbermann	FR [q1] [30h+30h] [5 Credits]
LMAT1222	Complex analysis 1	Tom Claeys	FR [q2] [30h+15h] [5 Credits]

Algèbre et géométrie

LMAT1231	Multilinear algebra and group theory	Pierre-Emmanuel Caprace	EN [q1] [30h+30h] [5 Credits]
LMAT1241	Geometry II	Pierre Bieliavsky	FR [q2] [45h+30h] [6 Credits]

Analyse numérique et Informatique

LMAT1151	Numerical analysis : tools and software of calculus	Jean Van Schaftingen	FR [q1] [30h+45h] [5 Credits]

Probabilités et statistiques

LMAT1271	Calculation of probability and statistical analysis	Rainer von Sachs	FR [q2] [30h+30h] [6 Credits]

Anglais

LANG1862	English: reading and listening comprehension of scientific texts	Ahmed Adrioueche (coord.) Catherine Avery Amandine Dumont Ariane Halleux (coord.) Adrien Kefer (compensates Laura Lievens)	EN [q1] [30h] [3 Credits]

Sciences humaines

Philosophie

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

LSC1120A	Philosophy	Alexandre Guay	FR [q1] [30h] [2 Credits]
LFILO1250A	Logic (partim)	Peter Verdée	FR [q2] [45h] [4 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

LMAT1261	Lagrangian and Hamiltonian mechanics	Christian Walmsley Hagendorf	FR [q1] [22.5h +30h] [5 Credits]
LMAT1323	Topology	Pedro Dos Santos Santana Forte Vaz	FR [q1] [30h+15h] [5 Credits]

Bloc Statistique et Informatique

A l'exception de LINFO1103, il est recommandé de suivre LINFO1101 avant les autres cours de la liste ci-dessous :

LINFO1103	Introduction to algorithms	Pierre Dupont	FR [q2] [30h+30h] [5 Credits]
LEPL1402	Informatics 2	Sébastien Jodogne Ramin Sadre Pierre Schaus	FR [q1] [30h+30h] [6 Credits]
LINMA1702	Optimization models and methods I	François Glineur	FR [q2] [30h +22.5h] [5 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.

MATH1BA - 3RD ANNUAL UNIT

- Mandatory
- Optional
- Not offered in 2021-2022
- Not offered in 2021-2022 but offered the following year
- Offered in 2021-2022 but not the following year
- Not offered in 2021-2022 or the following year
- Activity with requisites
- [FR] Teaching language (FR, EN, ES, NL, DE, ...)

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

Majeure

Analyse

LMAT1321	Functional analysis and partial differential equations	Jean Van Schaftingen	FR [q1] [45h+45h] [7 Credits]

Analyse numérique et Informatique

LMAT1351	Approximations : methods et theory	Tom Claeys	FR [q1] [30h+30h] [5 Credits]

Probabilités et statistiques

LMAT1371	Probability Theory	Johan Segers	FR [q2] [30h +22.5h] [5 Credits]

Séminaires et travaux de synthèse

LMAT1381	Personal project and seminary	Pedro Dos Santos Santana Forte Vaz Augusto Ponce	FR [q2] [30h] [6 Credits]

Anglais

LANG1863	English for Students in Sciences (Upper-Intermediate level)	Ahmed Adrioueche (coord.) Catherine Avery (coord.) Amandine Dumont (coord.) Sandrine Jacob (coord.) Hila Peer Nevin Serbest Colleen Starrs Françoise Stas (coord.)	EN [q1 or q2] [30h] [3 Credits]

Sciences humaines

Sciences religieuses

Students choose 2 credits from the following courses

LTECO2100	Sociétés, cultures, religions : Biblical readings	Hans Ausloos	FR [q1] [15h] [2 Credits]
LTECO2200	Societies-cultures-religions : Human Questions	Sébastien Dehorter (compensates Régis Burnet) Dominique Martens	FR [q1 or q2] [15h] [2 Credits]
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]
LMAT1322	Real and harmonic analysis	Augusto Ponce	FR [q2] [30h+30h] [5 Credits]
LMAT1342	Geometry 3	Pascal Lambrechts	FR [q1] [30h+30h] [5 Credits]
LMAT1331	Commutative algebra	Marino Gran Pierre-Alain Jacqmin (compensates Marino Gran)	FR [q2] [30h+15h] [5 Credits]
LMAT1361	Galois Theory	Pierre-Emmanuel Caprace	FR [q1] [30h+15h] [5 Credits]

Bloc Statistique et Informatique

A l'exception de LINFO1103, il est recommandé de suivre LINFO1101 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	Nathan Uyttendaele (compensates Johan Segers)	FR [q2] [30h+15h] [4 Credits]
LBIRA2110A	Modélisation et exploration des données multivariées - Biométrie	Xavier Draye Frédéric Gaspart Bernadette Govaerts	FR [q1] [30h+15h] [4 Credits]

Optional courses

These credits are not counted within the 120 required credits.

LSST1001	IngénieuxSud	Stéphanie Merle Jean-Pierre Raskin (coord.)	FR [q1+q2] [15h+45h] [5 Credits]
LSST1002M	Information and critical thinking - MOOC	Myriam De Kesel Jean-François Rees	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.

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.

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

- To be eligible to apply to a bachelor's programme, holder of a non-belgian degree who do not have Belgian student status must also:
  - have earned a secondary school degree within the last three years;
  - not already hold a bachelor's degree; and,
- 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).
- 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.

- Not to have obtained a secondary education diploma for more than 3 years maximum. Example: for an admission application for the academic year 2021-2022, you must have obtained your diploma during the academic years 2018-2019, 2019-2020 or 2020-2021. In the French Community of Belgium, the academic year runs from September 14 to September 13.l_information/2021/common-bachelor/

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 regulations concerning studies and exams (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

With the choice of an appropriate minor and/or a programme of complementary training, the Bachelor in Mathematics allows access to certain course choices of Master [120] in Physics, Master [120] in Computer Science or Master [120] in Economics: General.

En outre, des masters UCL (généralement orphelins) sont largement accessibles aux diplômés bacheliers UCL. Par exemple :

In addition, UCL master's programmes (usually orphaned) are widely available to UCL bachlors. For example:

- Master [120] in Population and Development Studies (direct access for any bachelor),
- Master [120] in European Studies (direct access for any bachelor with a minor in European Studies; on file for any other bachelor),
- ...

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: Augusto Ponce (https://uclouvain.be/repertoires/augusto.ponce)
- Secretary and study advisor: Tim Van der Linden (https://uclouvain.be/repertoires/tim.vanderlinden)

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)