UCLouvain

MATH2M

2021 - 2022

Master [120] in Mathematics

At Louvain-la-Neuve - 120 credits - 2 years - Day schedule - In French
Dissertation/Graduation Project : **YES** - Internship : **NO**
Activities in English: **YES** - Activities in other languages : **YES**
Activities on other sites : **NO**
Main study domain : **Sciences**
Organized by: **Faculty of Science (SC)**
Programme acronym: **MATH2M** - Francophone Certification Framework: 7

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MATH2M - Introduction

Introduction

Introduction

The Master 120 in Mathematics offers

- a thorough education in cutting-edge fundamental mathematics with an orientation towards either research or teaching;
- an interdisciplinary program in physics, statistics, probability, cryptography, information theory, financial mathematics, actuarial science, etc.;
- the possibility of including advanced courses from other universities within your programme of specialisation;
- teaching based on your personal learning history;
- the opportunity to carry out part of your programme abroad;
- the possibility of moving directly to the second year of the Master in statistics, biostatistics and actuarial science.

Your profile

You

- 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 wish 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

Whatever his specialisation, the mathematician will be able to exercise his talents in a variety of very different professional sectors and to make the most of the powerful tools he has developed in situations that are often a long way from mathematics.

The disciplinary knowledge and skills of the mathematician can be exploited in fundamental mathematical research and in teaching mathematics. These skills also offer access to many professions in which mathematics interacts with other disciplines (particularly in research laboratories in the climatology sector, in meteorology and in astronomy, in research and development institutes in the biochemistry and pharmacology sectors, in analysis and development departments in the economics sector, in finance and insurance, in computer companies, in cryptography and in telecommunications).

Your programme

Together with the solid training in fundamental mathematics that will equip you with tools in the main mathematical disciplines, the Master offers the choice of two focuses, depending on whether you are oriented towards research or teaching. In both options, learning is completed by optional courses in your chosen fields in mathematics or in closely related fields (applied mathematics, physics, statistics and biostatistics, actuarial science, computing...).

MATH2M - 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 practise the many professional activities that require substantial mathematical skills: research and teaching, but also highly varied professions in which mathematics interacts with other fields and mathematicians collaborate with people who come from different intellectual backgrounds.

The skills acquired during the course will allow him to adapt to different professional contexts (linked, for example, to economic sciences, to the engineering sciences, to health sciences) and to acquire rapidly the techniques specific to his profession.

The programme offers a general education in the important fields of fundamental mathematics, including recent advanced subjects, and allows the student to deal in depth with closely related fields that have already been introduced in the Bachelor in Mathematics (especially physics, but also statistics, actuarial science, and computing).

Depending on the choice of option, by the end of the course the graduate will also have acquired a deeper knowledge of a field of research (research focus) or the skills required to teach mathematics in secondary schools (teaching focus).

As with any UCL graduate, the graduate Master in Mathematics will be capable of taking a critical, constructive and innovative view of the present-day world and its problems, of acting as a responsible and competent citizen in society and in his professional milieu, of independently acquiring and using new knowledge and skills throughout his professional life, and of managing major projects in all their aspects, both individually and as part of a team.

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

Finalité spécialisée - Grâce aux cours de l'option choisie, les étudiants de deux options auront aussi acquis la capacité d'analyser, en profondeur et sous divers points de vue, un problème mathématique ou un système complexe relevant de disciplines scientifiques autres que les mathématiques, pour en extraire les points essentiels et les mettre en relation avec les outils théoriques les mieux adaptés.

pas d'acquis d'apprentissage détaillés

1) master the disciplinary knowledge and basic transferable skills whose acquisition began in the Bachelor programme. He will have expanded his basic disciplinary knowledge and skills.

• Choose and use the fundamental methods and 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) show evidence of abstract thinking and of a critical spirit.

• Recognise the fundamental concepts of important current mathematical theories.
• Identify the unifying aspects of different situations and experiences.
• Argue within the context of the axiomatic method.
• Construct and draw up a proof independently, clearly and rigorously.

3) communicate in a scientific manner.

• Write a mathematical text in French according to the conventions of the discipline.
• Structure an oral presentation and adapt it 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).

4) show evidence of independent learning.

• Find sources in the mathematical literature and assess their relevance.
• Correctly locate an advanced mathematical text in relation to knowledge acquired.
• Ask himself relevant and lucid questions on a mathematical topic in an independent manner.

5) analyse a mathematical problem and suggest appropriate tools for studying it in depth

• Rédiger un texte mathématique selon les conventions de la discipline.
• Structurer un exposé oral en l'adaptant au niveau d'expertise des interlocuteurs.

Finalité approfondie - L'étudiant qui se destine à la recherche aura acquis une connaissance plus approfondie d'un ou de plusieurs domaines des mathématiques actuelles et de ses problématiques. Ces connaissances visent à lui permettre d'interagir avec d'autres chercheurs dans le cadre d'une recherche de niveau doctoral.

• Développer de façon autonome son intuition mathématique en anticipant les résultats attendus (formuler des conjectures) et en vérifiant la cohérence avec des résultats déjà existants.
• Se documenter et résumer l'état des connaissances actuelles concernant un problème mathématique.
• Poser de façon autonome des questions pertinentes et lucides sur un sujet avancé de mathématique.
• Analyser un problème de recherche et proposer des outils adéquats pour l'étudier de façon approfondie et originale.

6) **if the research focus is chosen**, begin a research project thanks to a deeper knowledge of one or more fields and their problematic issues in current mathematics. This knowledge aims at allowing the student to interact with other researchers in the context of a research project at doctoral level.

• Develop in an independent way his mathematical intuition by anticipating the expected results (formulating conjectures) and by verifying their consistency with already existing results.

• Gather material and summarise the current state of knowledge relating to a mathematical problem.
• Ask relevant and lucid questions on an advanced mathematical topic in an independent manner.

Finalité didactique - L'étudiant qui se destine à l'enseignement sera prêt à assumer des tâches professionnelles dans l'enseignement secondaire et à apporter ses compétences pédagogiques et disciplinaires.

- Mettre en relation les contenus mathématiques du programme de l'enseignement secondaire et ceux de la formation universitaire.
- Comparer et intégrer différentes approches possibles aux principaux sujets du programme de mathématique de l'école secondaire, identifier les étapes clef et les points délicats du programme.
- Mettre en place des dispositifs d'apprentissage adaptés, originaux et pertinents tant du point de vue de la rigueur que du point de vue de l'intuition.
- Proposer des problèmes provenant de différents domaines permettant d'introduire, illustrer et mettre en œuvre des notions mathématiques du programme.

7) **if the teaching focus is chosen**, bring together the skills needed to successfully begin the career of teacher of mathematics in upper secondary school and to make positive progress.

• Take action in the school setting, in partnership with other involved parties.
• Teach in real and observed situations.

In a more specific way, in regard to the teaching of mathematics, the graduate is able:

- To link the mathematical content of the secondary school teaching programme with that of university education.
- Compare and integrate different possible approaches to the main subjects of secondary school mathematics, identify the key stages and the sensitive points of the programme.
- Employ learning methods that are appropriate, original and relevant both from the point of view of precision and from that of intuition.
- Formulate interdisciplinary examples in the form of problems to introduce, illustrate and put into practice the mathematical concepts of the programme.
- Be self-critical and plan with continuous development in mind. For more details, see Teacher training certificate (upper secondary education) (Mathematics).

Depending on the chosen focus, he will be able to adapt to various professional contexts and he will be able to :

- Do a statistical analysis of large sets of data with the help of softwares.
- Master several fields of current probability and mathematical statistics and their problems.
- Use basic concepts and models in survival analysis, specific tools of biostatistics and techniques and standards of clinical tests.
- Exploit in an integrated way various know-hows in actuarial sciences and in financial mathematics in order to analyse complex problems in quantitative management of risks.
- Use fundamental tools of computing and programming in order to solve management problems involved in the financial impact of risks.

Programme structure

The programme for the Master in Mathematical Sciences is composed of:

- core subjects of 50 credits, of which 26 credits are for the dissertation;
- a focus of 30 credits;
- one option and selected courses for 40 credits.

Note here that:

- a part of the programme of study corresponding to around 30 credits (some of which may be involved in writing the dissertation) may be performed in the context of one of the international mobility programmes established by the Faculty.
- Courses already taken as part of the in-depth minor in mathematics may not be included in the student's Master programme
- With the agreement of the School of Mathematics, the student may defer to the second year an activity scheduled for the first year or bring forward to the first year an activity scheduled for the second year (with the exception of LMAT2997 and LMAT2999). In these cases, timetable clashes may arise. For a standard programme, this Master will total, whatever the focus, the options and/or the optional courses chosen, a minimum of 120 credits divided into two annual sections of 60 credits each.

MATH2M Programme

Detailed programme by subject

CORE COURSES [50.0]

- 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...)

Mémoire et séminaire (28 credits)

				Year 1	Year 2
LMAT2997	Thesis tutorial	Ahmed Adrioueche Pedro Dos Santos Santana Forte Vaz	EN [q2] [15h] [2 Credits]		x
LMAT2999	Mémoire		FR [q2] [] [26 Credits]		x

Cours thématiques en mathématique

L'étudiant·e choisit au moins 20 crédits dans la liste ci-dessous :

LMAT2130	Partial differential equations	Heiner Olbermann	EN [q1] [30h+15h] [5 Credits]	x	x
LMAT2415	Advanced harmonic analysis	Jean Van Schaftingen	FR [q1] [30h+15h] [5 Credits]	x	x
LMAT2250	Calculus of variations	Augusto Ponce	FR [q2] [30h+15h] [5 Credits] ⊘	x	x
LMAT2120	Groups theory	Pierre-Emmanuel Caprace	FR [q1] [30h+15h] [5 Credits] ⊕	x	x
LMAT2150	Category theory	Marino Gran	EN [q1] [30h+15h] [5 Credits]	x	x
LMAT2221	Universal algebra	Enrico Vitale	FR [q2] [30h+15h] [5 Credits] △ ⊕	x	x
LMAT2215	Homological algebra	Tim Van der Linden	EN [q1] [30h+15h] [5 Credits] ⊘	x	x
LMAT2430	Lie's therory elements and differential geometry	Pierre Bieliavsky	FR [q2] [30h+15h] [5 Credits]	x	x
LMAT2420	Complex analysis	Tom Claeys	EN [q2] [30h+15h] [5 Credits] △	x	x
LMAT2265	Complex geometry		FR [q2] [30h+15h] [5 Credits] △ ⊕	x	x
LMAT2140	Algebraic topology	Pedro Dos Santos Santana Forte Vaz Pascal Lambrechts	EN [q1] [30h+15h] [5 Credits] ⊘	x	x
LMAT2240	Low-dimensional topology	Pedro Dos Santos Santana Forte Vaz Pascal Lambrechts	EN [q2] [30h+15h] [5 Credits]	x	x

Philosophy (2 credits)

Students will choose from the following
2 credits to choose between

LSC2001	Introduction to contemporary philosophy	Peter Verdée	FR [q2] [30h] [2 Credits]		x
LSC2220	Philosophy of science	Pieter Thyssen (compensates Alexandre Guay)	EN [q2] [30h] [2 Credits]		x
LFILO2003E	Ethics in the Sciences and technics (sem)	Hervé Jeanmart Charles Pence René Rezsohazy	FR [q2] [15h+15h] [2 Credits]		x
LTHEO2840	Science and Christian faith	Benoît Bourgine Dominique Lambert	FR [q1] [15h] [2 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	x

				Year 1	2
LSST1002M	Information and critical thinking - MOOC	Myriam De Kesel Jean-François Rees	FR [q2] [30h+15h] [3 Credits]	x	x

LIST OF FOCUSES

> Research Focus [en-prog-2021-math2m-lmath200a]
> Teaching Focus [en-prog-2021-math2m-lmath200d]

RESEARCH FOCUS [30.0]

In the research focus, the programme offers a general education in the major fields of fundamental mathematics and a deeper education in one of the research areas of the School of Mathematics. In seminar LMAT2160, a research project is set up by the students. With the agreement of the School, students may replace courses in the research focus by courses in research given in other universities, by courses chosen from the various options, or by courses in the Master in Physics.

- 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...)

Content:

				Year 1	Year 2
LMAT2160	Training seminar for mathematical researchers	Pierre-Emmanuel Caprace Jean Van Schaftingen	FR [q1] [15h] [5 Credits]	x	
LMAT2165	Personal project in mathematics	Pierre Bieliavsky Pedro Dos Santos Santana Forte Vaz	FR [q2] [15h] [5 Credits]	x	

Cours thématiques en mathématique (5 credits)

L'étudiant·e choisit au moins 5 à 10 crédits supplémentaires dans la liste des cours thématiques en mathématique du tronc commun.

Cours approfondis

L'étudiant.e choisit de 10 à 15 crédits parmi les cours ci-dessous :

Avanced topics

LMAT2910	Advanced topics in mathematics 1	Tim Van der Linden	EN [q1] [0h+30h] [5 Credits] ⊕	x	x
LMAT2920	Advanced topics in mathematics 2	Timothée Marquis	EN [q2] [30h] [5 Credits] ⊕	x	x
LMAT2930	Advanced topics in mathematics 3	Jacques Darne	EN [q1] [30h] [5 Credits] ⊕	x	x
LMAT2940	Advanced topics in mathematics 4	Tom Claeys	EN [q2] [0h+22.5h] [5 Credits] ⊕	x	x
LMAT2915	Advanced topics in mathematics 5		EN [q2] [0h+30h] [5 Credits] ⊘	x	x
LMAT2925	Advanced topics in mathematics 6		EN [q2] [30h] [5 Credits] ⊘	x	x
LMAT2935	Advanced topics in mathematics 7		EN [q2] [30h] [5 Credits] ⊘	x	x
LMAT2945	Advanced topics in mathematics 8		EN [q1] [0h+22.5h] [5 Credits] ⊘	x	x

Cours approfondis de mathématique à l'ULB

L'étudiant·e pourra choisir, en concertation avec le conseiller aux études, des cours parmi ceux de la finalité approfondie du programme de master en mathématique de l'ULB. NB : Une liste de cours recommandés sera mise à jour et proposée chaque année.

TEACHING FOCUS [30.0]

IMPORTANT NOTE: In accordance with article 138 para. 4 of the decree of 7 November 2013 concerning higher education and the academic organisation of studies, teaching practice placements will not be assessed in the September session. Students are required to make every effort to successfully complete the teaching practice in the June session, subject to having to retake the year.

In the teaching focus, the programme offers general training for the secondary school teacher and specific training in teaching mathematics. The teaching focus confers on the student the title of qualified teacher for upper secondary education.

- O 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...)

O Content:

				Year 1	Year 2
O Séminaire d'observation et d'analyse de l'institution scolaire et de son contexte (en ce compris le stage d'observation) (4 credits)					
Choisir 1 des activités suivantes. Le cours et le séminaire doivent être suivis au même quadrimestre.					
⊠ LAGRE2120P	Observation et analyse de l'institution scolaire et de son contexte (en ce compris le stage d'observation)	Samir Barbana (compensates Vincent Dupriez) Branka Cattonar	FR [q1] [22.5h+25h] [4 Credits]		x
⊠ LAGRE2120Q	Observation et analyse de l'institution scolaire et de son contexte (en ce compris le stage d'observation)	Samir Barbana (compensates Vincent Dupriez) Branka Cattonar	FR [q2] [22.5h+25h] [4 Credits]		x
O Comprendre l'adolescent en situation scolaire, gérer la relation interpersonnelle et animer le groupe classe (4 credits)					
Choisir 1 des activités suivantes. Le cours et le séminaire doivent être suivis au même quadrimestre.					
⊠ LAGRE2020P	Comprendre l'adolescent en situation scolaire, Gérer la relation interpersonnelle et animer le groupe classe.	Baptiste Barbot Véronique Leroy Nathalie Roland	FR [q1] [22.5h+22.5h] [4 Credits]		x
⊠ LAGRE2020Q	Comprendre l'adolescent en situation scolaire, Gérer la relation interpersonnelle et animer le groupe classe.	Baptiste Barbot Véronique Leroy Nathalie Roland	FR [q2] [22.5h+22.5h] [4 Credits]		x
O LMAT2310	Stages d'enseignement en mathématique (en ce compris le séminaire d'intégration des stages)	Laure Ninove	FR [q1+q2] [45h+10h] [7 Credits]	x	x
O Concevoir, planifier et évaluer des pratique d'enseignement et d'apprentissage (13 credits)					
O LMAT2320	Didactique et épistémologie de la mathématique	Laure Ninove Rosane Tossut	FR [q1+q2] [60h] [6 Credits]	x	x
O LAGRE2220	General didactics and education to interdisciplinarity	Stéphane Colognesi Myriam De Kesel Jean-Louis Dufays Anne Ghysselinckx Véronique Lemaire Olivier Maes Jim Plumat Benoît Vercruysse	FR [q1 or q2] [37.5h] [3 Credits]	x	x
O Didactique et épistémologie d'une autre discipline (en ce compris le stage d'écoute) (4 credits)					
Students will choose one course from the following					
⊠ LGEO2320A	Didactique et épistémologie de la géographie (en ce compris le stage d'écoute)	Marie-Laurence De Keersmaecker	FR [q1] [37.5h+10h] [4 Credits]		x
⊠ LMAT2330	Seminar on the teaching of mathematics	Enrico Vitale	FR [q1+q2] [15h+30h] [4 Credits] △		x

					Year 1	2
⊠	LSCI2320A	Didactique et épistémologie des sciences	Myriam De Kesel Nathalie Matthys Jim Plumat	FR [q1] [37.5h+10h] [4 Credits]		x
○	LAGRE2400	See specifications in french	Hervé Pourtois (coord.) Pierre-Etienne Vandamme	FR [q2] [20h] [2 Credits]	x	x

OPTIONS [40.0]

Whatever the focus followed, the student completes the programme to obtain 120 credits.

> Option in Statistics *[en-prog-2021-math2m-lmath221o]*
> Option sciences actuarielles *[en-prog-2021-math2m-lmath222o]*
> Option mathématiques appliquées *[en-prog-2021-math2m-lmath101o]*
> Option biostatistique *[en-prog-2021-math2m-lmath102o]*
> Autres cours au choix *[en-prog-2021-math2m-lmath100o]*

OPTION IN STATISTICS [30.0]

- 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...)

UCL graduates in the Master in Mathematics with option in general statistics have direct access to the second year of the Master in Statistics with orientation in general statistics.

Content:

				Year 1	Year 2
LSTAT2040	Statistical analysis	Benjamin Colling (compensates Anouar El Ghouch)	FR [q2] [30h+15h] [5 Credits]	x	x
LSTAT2020	Statistical softwares and basic statistical programming	Céline Bugli	FR [q1] [15h+15h] [3 Credits]	x	x
LSTAT2030	Statistique et data sciences avec R: Programmation avancée	Anouar El Ghouch	FR [q2] [15h+15h] [3 Credits]	x	x
LSTAT2110	Data Analysis	Johan Segers	FR [q1] [30h+7.5h] [5 Credits]	x	x
LSTAT2120	Linear models	Christian Hafner	EN [q1] [30h+7.5h] [5 Credits]	x	x
LSTAT2140	Non parametric statistics	Eugen Pircalabelu	FR [q1] [15h+5h] [4 Credits]	x	x

Cours au choix

Students will choose one course from the following

LMAT2470	Processus stochastiques (statistique)	Donatien Hainaut	FR [q2] [30h] [5 Credits]	x	
LSTAT2440	Inference and Data Reduction	Rainer von Sachs	EN [q1] [15h+7.5h] [5 Credits]		x

OPTION SCIENCES ACTUARIELLES [30.0]

- 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...)

NB : Students wishing to subsequently enroll in the Master in Actuarial Sciences may valorize all the compulsory courses of the ACTU2M program for which the credits have been validated in MATH2M.

Content:

				Year 1	Year 2
LACTU2020	Fixed income mathematics	Pierre Devolder	FR [q1] [45h+15h] [7 Credits]	x	x
LACTU2030	LIFE INSURANCE	Donatien Hainaut	FR [q1] [45h] [7 Credits]	x	x
LACTU2010	NON LIFE INSURANCE	Michel Denuit	FR [q1] [45h] [7 Credits]	x	x
LACTU2040	PENSION FUNDING	Pierre Devolder	FR [q2] [30h+15h] [5 Credits]	x	x
LACTU2170	STOCHASTIC FINANCE	Donatien Hainaut	FR [q2] [30h] [5 Credits]	x	x
LACTU2210	Quantitative Risk Management	Christian Hafner	EN [q2] [30h] [5 Credits]	x	x
LINMA2725	Financial mathematics	Pierre Devolder	FR [q1] [30h+22.5h] [5 Credits]	x	x

OPTION MATHÉMATIQUES APPLIQUÉES [30.0]

- 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...)

Content:

				Year 1	Year 2
Optional LINMA2380	Matrix computations	Raphaël Jungers	EN [q1] [30h+22.5h] [5 Credits]	x	x
Optional LINMA2470	Stochastic modelling	Philippe Chevalier	EN [q2] [30h+22.5h] [5 Credits]	x	x
Optional LINMA2471	Optimization models and methods II	François Glineur Geovani Nunes Grapiglia	EN [q1] [30h+22.5h] [5 Credits]	x	x
Optional LINMA2345	Game theory	Matthew Philippe (compensates Raphaël Jungers)	EN [q2] [30h+22.5h] [5 Credits]	x	x
Optional LINMA2450	Combinatorial optimization	Julien Hendrickx Geovani Nunes Grapiglia	EN [q1] [30h+22.5h] [5 Credits]	x	x
Optional LINMA2171	Numerical Analysis : Approximation, Interpolation, Integration	Pierre-Antoine Absil	EN [q1] [30h+22.5h] [5 Credits]	x	x
Optional LINMA2472	Algorithms in data science	Jean-Charles Delvenne (coord.) Gautier Krings (compensates Vincent Blondel)	EN [q1] [30h+22.5h] [5 Credits]	x	x
Optional LMAT2450	Cryptography	Olivier Pereira	EN [q1] [30h+15h] [5 Credits]	x	x
Optional LINMA2111	Discrete mathematics II : Algorithms and complexity	Jean-Charles Delvenne Jean-Charles Delvenne (compensates Vincent Blondel)	EN [q1] [30h+22.5h] [5 Credits]	x	x

OPTION BIOSTATISTIQUE [30.0]

- 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...)

UCL graduates in the Master in Mathematics with option in general statistics have access to the second year of the Master in Statistics with biostatistics orientation. Students will choose one course between LSTAT2130 and LSTAT2220. Students will choose one course from the following

Content:

				Year 1	Year 2
LSTAT2020	Statistical softwares and basic statistical programming	Céline Bugli	FR [q1] [15h+15h] [3 Credits]	x	x
LSTAT2030	Statistique et data sciences avec R: Programmation avancée	Anouar El Ghouch	FR [q2] [15h+15h] [3 Credits]	x	x
LSTAT2040	Statistical analysis	Benjamin Colling (compensates Anouar El Ghouch)	FR [q2] [30h+15h] [5 Credits]	x	x
LSTAT2110	Data Analysis	Johan Segers	FR [q1] [30h+7.5h] [5 Credits]	x	x
LSTAT2120	Linear models	Christian Hafner	EN [q1] [30h+7.5h] [5 Credits]	x	x
LSTAT2330	Statistics in clinical trials.	Catherine Legrand Annie Robert	FR [q2] [22.5h+7.5h] [5 Credits]	x	x

Une unité d'enseignement parmi

LSTAT2130	Introduction to Bayesian statistics	Philippe Lambert	EN [q2] [15h+5h] [4 Credits]	x	x
LSTAT2220	Analysis of survival and duration data	Ingrid Van Keilegom	FR [q1] [15h+5h] [4 Credits]	x	x

AUTRES COURS AU CHOIX

- 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...)

Content:

				Year 1	Year 2
LMAT2440	Number theory	Olivier Pereira Jean-Pierre Tignol	FR [q1] [30h+15h] [5 Credits]	x	x
LMAT2460	Finite mathematics and combinatorial structures	Jean-Charles Delvenne Raphaël Jungers	FR [q1] [30h] [5 Credits]	x	x
LMAT2335	Mathematical didactics workshop	Pascal Lambrechts	FR [q1+q2] [0h+45h] [5 Credits]	x	x
LPHYS2114	Nonlinear dynamics	Christian Hagendorf	EN [q1] [22.5h+22.5h] [5 Credits]	x	x

Course prerequisites

There are no prerequisites between course units (CUs) for this programme, i.e. the programme activity (course unit, CU) whose learning outcomes are to be certified and the corresponding credits awarded by the jury before registration in another CU.

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.

MATH2M - Information

Access Requirements

Master course admission requirements are defined by the French Community of Belgium Decree of 7 November 2013 defining the hiher education landscape and the academic organisation of courses.

General and specific admission requirements for this programme must be satisfied at the time of enrolling at the university.

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

SUMMARY

Specific access requirements

In addition to meeting the access conditions described below, candidates will have to provide proof of a sufficient command of the French language (level B1 of the CEFR, Common European Framework of Reference for Languages).

Students wishing to access the didactic purpose must provide proof of a level C1 of the CEFR.

Students who wish to be admitted on the basis of a dossier (see tables below) are invited to consult the criteria for the evaluation of application.

University Bachelors

Diploma	Special Requirements	Access	Remarks
UCLouvain Bachelors			
Bachelor in Mathematics		Direct access	
Bachelor in Physics	Si l'étudiant a suivi la Titre inconnu:Iminmath	Direct access	In some cases, the UCLouvain Enrolment Office, after reviewing their online enrolment or re-enrolment application, will ask the students concerned to provide an enrolment authorisation from the faculty/ school.
Bachelor in Engineering	Si l'étudiant a suivi la Titre inconnu:Iminmath ou si l'étudiant a suivi le programme de majeure en mathématiques appliquées	Direct access	In some cases, the UCLouvain Enrolment Office, after reviewing their online enrolment or re-enrolment application, will ask the students concerned to provide an enrolment authorisation from the faculty/ school.
Others Bachelors of the French speaking Community of Belgium			
		Direct access	
Bachelors of the Dutch speaking Community of Belgium			
		Direct access	
Foreign Bachelors			
		Access based on application	

Non university Bachelors

> Find out more about links to the university

Holders of a 2nd cycle University degree

Diploma	Special Requirements	Access	Remarks
"Licenciés"			
		Direct access	
Masters			
		Direct access	

Holders of a non-University 2nd cycle degree

Access based on validation of professional experience

> It is possible, under certain conditions, to use one's personal and professional experience to enter a university course without having the required qualifications. However, validation of prior experience does not automatically apply to all courses. Find out more about Validation of priori experience.

Access based on application

Admission on the basis of a submitted dossier may be granted either directly or on the condition of completing additional coursework of a maximum of 60 ECTS credits, or refused.

The first step in the procedure is to submit a file online (see https://uclouvain.be/en/study/inscriptions/futurs-etudiants.html).

Students who wish to be admitted on the basis of a dossier are invited to consult the criteria for the evaluation of application.

Admission and Enrolment Procedures for general registration

Specific professional rules

Successful completion of the master's course with **teaching focus** leads to the award of the master's degree with teaching focus and the title of secondary school education specialist.

The Réforme des Titres et Fonctions ("Titles and Functions Reform"), in force since 1 September 2016, is intended to harmonise the titles, functions and pay scales of basic and secondary education professionals in French Community of Belgium networks.

It also aims to guarantee the priority of preferred titles over minimum titles and to establish a regime for titles in short supply.

AESS holders can learn which functions they can carry out and the pay scales from which they can benefit by clicking here.

The university cannot be held responsible for any problems that students may encounter at a later date with a view to a teaching appointment in the French Community of Belgium.

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 seminars specific to the focuses (where students are responsible for work progress), in work linked to the preparation of the dissertation and in the dissertation activity (the Thesis Tutorial, which specifically concentrates on scientific communication in English). The interdisciplinary character of the programme is reinforced by the presence in the options of courses taken from the Masters programmes in physics, in statistics and biostatistics, in actuarial science and in applied mathematics.

Students in the research focus may take introduction to research courses in neighbouring universities in order to learn about mathematical research subjects that are not offered by UCL. An additional teaching module in disciplines other than mathematics is possible for students in the teaching focus.

Evaluation

The evaluation methods comply with the regulations concerning studies and exams. 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 individual 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.

Whatever the teaching language of an activity, students may choose to present the corresponding assessment in English or in French. Exceptions are the Thesis Tutorial, philosophy courses and activities specific to the teaching focus.

Mobility and/or Internationalisation outlook

Students in the two focuses will have the opportunity of making an Erasmus, Mercator or other study period. The aim of such a study period is either to follow around 30 course credits, or to write the dissertation, while at the same time having the chance to discover another country and a different culture.

For students in the teaching focus it is preferable for the study period to take place at the end of the year. Partner universities are located in Dutch-speaking Belgium (in this case, the entire second year of the Master may take place outside UCL), in Europe (Italy, Spain, France, Denmark), in Australia, in Canada, in South Africa and in Japan. See https://uclouvain.be/fr/facultes/sc/programmes-d-echange-d-etudiants.html for a detailed presentation of the international mobility activities organised by the Faculty of Sciences. Courses LMAT2910 - Advanced topics 1, LMAT2920 - Advanced topics 2 and LMAT2930 - Advanced topics 3 are given by visiting professors from various Belgian and foreign institutions.The titles of these courses are generic in order to maintain the greatest flexibility and the best match with the development of research.

These courses are often taught in English.

Possible trainings at the end of the programme

Whatever the focus, the Master in Mathematics gives access to the doctorate in science.

The general statistics, biostatistics, and actuarial science options allow access to the second year of the corresponding Master, with a possible additional maximum of 15 credits in the second year programme of the corresponding Master.

Students who have earned a Master's degree in one of the focuses may gain a second Master in Mathematics in the other focus by means of a personalised one-year programme.

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

Jury

- President and Study advisor: Pedro Vaz
- Secretary: Heiner Olbermann

Useful Contact(s)

- Administrative manager for the student's annual program: Christine Henry de Frahan
- Secretary of the School of mathematics: Catherine De Roy