

**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: **Faculté des sciences (SC)**Programme acronym: **math2m** - Francophone Certification Framework: 7**Table of contents**

Introduction .....	2
Teaching profile .....	3
- Learning outcomes .....	3
- Programme structure .....	4
- Detailed programme .....	6
- Programme by subject .....	6
- Course prerequisites .....	15
- The programme's courses and learning outcomes .....	15
Information .....	16
- Admission .....	16
- Teaching method .....	18
- Evaluation .....	18
- Mobility and/or Internationalisation outlook .....	18
- Possible trainings at the end of the programme .....	18
- Contacts .....	18

## MATH2M - Introduction

### Introduction

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#### 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 profil

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 futur 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.

*For a programme-type, and regardless of the focus, options/or elective courses selected, this master will carry a minimum of 120 credits divided over two annual units, corresponding to 60 credits each.*

[> Core courses](#) [ [en-prog-2019-math2m-lmath220t.html](#) ]

Focuses

[> Research Focus](#) [ [en-prog-2019-math2m-lmath200a](#) ]

[> Teaching Focus](#) [ [en-prog-2019-math2m-lmath200d](#) ]

Options courses

[> Option in Statistics](#) [ [en-prog-2019-math2m-lmath221o.html](#) ]

[> Option sciences actuarielles](#) [ [en-prog-2019-math2m-lmath222o.html](#) ]

[> Option mathématiques appliquées](#) [ [en-prog-2019-math2m-lmath101o.html](#) ]

- > [Option biostatistique](#) [*en-prog-2019-math2m-lmath102o.html*]
- > [Autres cours au choix](#) [*en-prog-2019-math2m-lmath100o.html*]

## MATH2M Detailed programme

### Programme by subject

#### CORE COURSES [50.0]

○ Mandatory

△ Courses not taught during 2019-2020

⊕ Periodic courses taught during 2019-2020

⊗ Optional

⊙ Periodic courses not taught during 2019-2020

■ Activity with requisites

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

						Year	
						1	2
○ LMAT2997	<a href="#">Thesis tutorial</a>	Ahmed Adriouèche Pedro Dos Santos Santana Forte Vaz	15h	2 Credits	2q		x
○ LMAT2999	<a href="#">Mémoire</a>			26 Credits	2q		x

#### ○ Cours thématiques en mathématique

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

⊗ LMAT2130	<a href="#">Partial differential equations</a>	Heiner Olbermann	30h+15h	5 Credits	1q	x	x
⊗ LMAT2415	<a href="#">Advanced harmonic analysis</a>	Jean Van Schaftingen	30h+15h	5 Credits	1q	x	x
⊗ LMAT2250	<a href="#">Calculus of variations</a>	Augusto Ponce	30h+15h	5 Credits	2q ⊙	x	x
⊗ LMAT2120	<a href="#">Groups theory</a>	Pierre-Emmanuel Caprace	30h+15h	5 Credits	1q ⊕	x	x
⊗ LMAT2150	<a href="#">Category theory</a>	Marino Gran	30h+15h	5 Credits	1q	x	x
⊗ LMAT2221	<a href="#">Universal algebra</a>	Enrico Vitale	30h+15h	5 Credits	2q ⊕	x	x
⊗ LMAT2215	<a href="#">Homological algebra</a>		30h+15h	5 Credits	1q ⊙	x	x
⊗ LMAT2430	<a href="#">Lie's theory elements and differential geometry</a>	Pierre Bieliavsky	30h+15h	5 Credits	2q	x	x
⊗ LMAT2420	<a href="#">Complex analysis</a>	Tom Claeyes	30h+15h	5 Credits	2q	x	x
⊗ LMAT2265	<a href="#">Complex geometry</a>	Luc Haine	30h+15h	5 Credits	2q	x	x
⊗ LMAT2140	<a href="#">Algebraic topology</a>	Pedro Dos Santos Santana Forte Vaz Pascal Lambrechts	30h+15h	5 Credits	1q ⊙	x	x
⊗ LMAT2240	<a href="#">Low-dimensional topology</a>	Pedro Dos Santos Santana Forte Vaz Pascal Lambrechts	30h+15h	5 Credits	2q	x	x

#### ○ Philosophy (2 credits)

Students will choose from the following

2 credits to choose between

⊗ LSC2001	<a href="#">Introduction to contemporary philosophy</a>	François Kammerer (compensates Peter Verdée)	30h	2 Credits	2q		x
⊗ LSC2220	<a href="#">Philosophy of science</a>	Alexandre Guay	30h	2 Credits	2q		x
⊗ LFILO2003E	<a href="#">Ethics in the Sciences and technics (sem)</a>	Charles Pence	15h+15h	2 Credits	2q		x
⊗ LTSEO2840	<a href="#">Science and Christian faith</a>	Benoît Bourguine (coord.) Dominique Lambert	15h	2 Credits	1q		x

Year

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**⌘ Cours facultatif : Ingénieux Sud**

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Les 5 crédits de cours ne sont pas comptabilisés dans les 120 crédits requis.

⌘ LSST1001	IngénieuxSud	Jean-Pierre Raskin	15h+45h	5 Credits	1 + 2q	x	x
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## LIST OF FOCUSES

- > [Research Focus](#) [ en-prog-2019-math2m-lmath200a ]  
 > [Teaching Focus](#) [ en-prog-2019-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  
 Courses not taught during 2019-2020  
 Periodic courses taught during 2019-2020  
 Optional  
 Periodic courses not taught during 2019-2020  
 Activity with requisites

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

Year

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### o Contenu:

<input type="radio"/> LMAT2160	<a href="#">Training seminar for mathematical researchers</a>	Pierre-Emmanuel Caprace Jean Van Schaftingen	15h	5 Credits	1q	x	
<input type="radio"/> LMAT2165	<a href="#">Personal project in mathematics</a>	Pierre Bieliavsky Pedro Dos Santos Santana Forte Vaz	15h	5 Credits	2q	x	

### o Cours thématiques en mathématique (5 credits)

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

### o Cours approfondis

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

#### ⌘ Avanced topics

<input checked="" type="radio"/> LMAT2910	<a href="#">Advanced topics in mathematics 1</a>	Jean Van Schaftingen	30h	5 Credits	1q	x	
<input checked="" type="radio"/> LMAT2920	<a href="#">Advanced topics in mathematics 2</a>	Paolo Roselli	30h	5 Credits	2q	x	
<input checked="" type="radio"/> LMAT2930	<a href="#">Advanced topics in mathematics 3</a>	Tom Claeys	30h	5 Credits	2q	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.

○ Mandatory

△ Courses not taught during 2019-2020

⊕ Periodic courses taught during 2019-2020

⊗ Optional

⊖ Periodic courses not taught during 2019-2020

■ Activity with requisites

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

Year

1 2

**o Contenu:****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)	Branka Cattonar	22.5h +25h	4 Credits	1q	x	
⊗ LAGRE2120Q	Observation et analyse de l'institution scolaire et de son contexte (en ce compris le stage d'observation)	Branka Cattonar	22.5h +25h	4 Credits	2q		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.	Pascale Steyns	22.5h +22.5h	4 Credits	1q	x	
⊗ LAGRE2020Q	Comprendre l'adolescent en situation scolaire, Gérer la relation interpersonnelle et animer le groupe classe.	Pascale Steyns	22.5h +22.5h	4 Credits	2q		x
○ LMAT2310	Stages d'enseignement en mathématique (en ce compris le séminaire d'intégration des stages)	Laure Ninove	15h+40h	7 Credits	1 + 2q	x	x

**o Concevoir, planifier et évaluer des pratique d'enseignement et d'apprentissage (13 credits)**

○ LMAT2320	Didactique et épistémologie de la mathématique	Thérèse Gilbert Laure Ninove Rosane Tossut	60h	6 Credits	1 + 2q	x	x
○ LAGRE2220	General didactics and education to interdisciplinarity	Myriam De Kesel Jean-Louis Dufays (coord.) Anne Ghysseleynckx Véronique Lemaire Jim Plumet Marc Romainville Benoît Verducysse	37.5h	3 Credits	2q	x	x

**○ 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	37.5h +10h	4 Credits	1q		x
⊗ LMAT2330	Seminar on the teaching of mathematics	Enrico Vitale	15h+30h	4 Credits			x
⊗ LSCI2320A	Didactique et épistémologie des sciences	Myriam De Kesel (coord.) Jim Plumet Valérie Wathélet	37.5h +10h	4 Credits	1q		x
○ LAGRE2400	See specifications in french	Michel Dupuis Anne Ghysseleynckx	20h	2 Credits	2q	x	x



## OPTIONS [40.0]

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

- > [Option in Statistics](#) [ en-prog-2019-math2m-lmath221o ]
- > [Option sciences actuarielles](#) [ en-prog-2019-math2m-lmath222o ]
- > [Option mathématiques appliquées](#) [ en-prog-2019-math2m-lmath101o ]
- > [Option biostatistique](#) [ en-prog-2019-math2m-lmath102o ]
- > [Autres cours au choix](#) [ en-prog-2019-math2m-lmath100o ]

## OPTION IN STATISTICS [30.0]

- Mandatory
- △ Courses not taught during 2019-2020
- ⊕ Periodic courses taught during 2019-2020
- ⊗ Optional
- ⊖ Periodic courses not taught during 2019-2020
- Activity with requisites

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.*

Year  
1 2

### o Contenu:

● LSTAT2040	<a href="#">Statistical analysis</a>	Benjamin Colling	30h+15h	5 Credits	2q	x	
● LSTAT2020	<a href="#">Statistical softwares and basic statistical programming</a>	Céline Bugli	15h+15h	3 Credits	1q	x	
● LSTAT2030	<a href="#">Statistique et data sciences avec R: Programmation avancée</a>	Anouar El Ghouch	15h+15h	3 Credits	2q	x	
● LSTAT2110	<a href="#">Data Analysis</a>	Johan Segers	30h+7.5h	5 Credits	1q	x	
● LSTAT2120	<a href="#">Linear models</a>	Christian Hafner	30h+7.5h	5 Credits	1q	x	
● LSTAT2140	<a href="#">Non parametric statistics</a>	Eugen Pircalabelu	15h+5h	4 Credits	1q	x	

### o Cours au choix

Students will choose one course from the following

⊗ LMAT2470	<a href="#">Processus stochastiques (statistique)</a>	Donatien Hainaut	30h	5 Credits	2q	x	
⊗ LSTAT2050	<a href="#">Analyse statistique II</a>	Eugen Pircalabelu Rainer von Sachs	30h+15h	5 Credits	1q		x

**OPTION SCIENCES ACTUARIELLES [30.0]**

● Mandatory

△ Courses not taught during 2019-2020

⊕ Periodic courses taught during 2019-2020

⊗ Optional

⊖ Periodic courses not taught during 2019-2020

■ Activity with requisites

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.*

Year

1 2

**o Contenu:**

⊗ LACTU2020	<a href="#">Fixed income mathematics</a>	Pierre Devolder	45h+15h	7 Credits	1q	x	
⊗ LACTU2030	<a href="#">LIFE INSURANCE</a>	Donatien Hainaut	45h	7 Credits	1q	x	
⊗ LACTU2010	<a href="#">NON LIFE INSURANCE</a>	Michel Denuit	45h	7 Credits	1q	x	
⊗ LACTU2040	<a href="#">PENSION FUNDING</a>	Sébastien de Valeriola (compensates Pierre Devolder) Pierre Devolder	30h+15h	5 Credits	2q	x	
⊗ LACTU2170	<a href="#">STOCHASTIC FINANCE</a>	Donatien Hainaut	30h	5 Credits	2q	x	
⊗ LACTU2210	<a href="#">Quantitative Risk Management</a>	Christian Hafner	30h	5 Credits	2q	x	
⊗ LINMA2725	<a href="#">Financial mathematics</a>	Pierre Devolder	30h +22.5h	5 Credits	1q	x	

**OPTION MATHÉMATIQUES APPLIQUÉES [30.0]**

● Mandatory

△ Courses not taught during 2019-2020

⊕ Periodic courses taught during 2019-2020

⊗ Optional

⊖ Periodic courses not taught during 2019-2020

■ Activity with requisites

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

Year

1 2

o **Contenu:**

⊗ LINMA2380	<a href="#">Matrix computations</a>	Raphaël Jungers	30h +22.5h	5 Credits	1q	x	
⊗ LINMA2470	<a href="#">Stochastic modelling</a>	Philippe Chevalier Raphaël Jungers (compensates Philippe Chevalier)	30h +22.5h	5 Credits	2q	x	
⊗ LINMA2471	<a href="#">Optimization models and methods II</a>	François Glineur	30h +22.5h	5 Credits	1q	x	
⊗ LINMA2345	<a href="#">Game theory</a>	Raphaël Jungers	30h +22.5h	5 Credits	2q	x	
⊗ LINMA2450	<a href="#">Combinatorial optimization</a>	Jean-Charles Delvenne (coord.) Julien Hendrickx	30h +22.5h	5 Credits	1q	x	
⊗ LINMA2171	<a href="#">Numerical Analysis : Approximation, Interpolation, Integration</a>	Pierre-Antoine Absil	30h +22.5h	5 Credits	1q	x	
⊗ LINMA2472	<a href="#">Algorithms in data science</a>	Vincent Blondel Jean-Charles Delvenne (coord.) Gautier Krings (compensates Vincent Blondel)	30h +22.5h	5 Credits	1q	x	
⊗ LMAT2450	<a href="#">Cryptography</a>	Olivier Pereira	30h+15h	5 Credits	1q	x	

**OPTION BIOSTATISTIQUE [30.0]**

● Mandatory

△ Courses not taught during 2019-2020

⊕ Periodic courses taught during 2019-2020

⊗ Optional

⊖ Periodic courses not taught during 2019-2020

■ Activity with requisites

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*

Year

1 2

**o Contenu:**

● LSTAT2020	<a href="#">Statistical softwares and basic statistical programming</a>	Céline Bugli	15h+15h	3 Credits	1q	x	
● LSTAT2030	<a href="#">Statistique et data sciences avec R: Programmation avancée</a>	Anouar El Ghouch	15h+15h	3 Credits	2q	x	
● LSTAT2040	<a href="#">Statistical analysis</a>	Benjamin Colling	30h+15h	5 Credits	2q	x	
● LSTAT2110	<a href="#">Data Analysis</a>	Johan Segers	30h+7.5h	5 Credits	1q	x	
● LSTAT2120	<a href="#">Linear models</a>	Christian Hafner	30h+7.5h	5 Credits	1q	x	
● LSTAT2330	<a href="#">Statistics in clinical trials.</a>	Catherine Legrand Annie Robert	22.5h +7.5h	5 Credits	2q	x	

**o Une unité d'enseignement parmi**

⊗ LSTAT2130	<a href="#">Introduction to Bayesian statistics</a>	Philippe Lambert	15h+5h	4 Credits	2q	x	
⊗ LSTAT2220	<a href="#">Analysis of survival and duration data</a>	Ingrid Van Keilegom	15h+5h	4 Credits	1q	x	

## AUTRES COURS AU CHOIX

● Mandatory

△ Courses not taught during 2019-2020

⊕ Periodic courses taught during 2019-2020

⊗ Optional

⊙ Periodic courses not taught during 2019-2020

■ Activity with requisites

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

Year

1 2

### o Contenu:

⊗ LMAT2440	<a href="#">Number theory</a>	Olivier Pereira Jean-Pierre Tignol	30h+15h	5 Credits	1q	x	x
⊗ LMAT2460	<a href="#">Finite mathematics and combinatorial structures</a>	Jean-Charles Delvenne Raphaël Jungers	30h	5 Credits	1q	x	x
⊗ LMAT2335	<a href="#">Mathematical didactics workshop</a>	Pascal Lambrechts	0h+45h	5 Credits	1 + 2q	x	x
⊗ LPHYS2114	<a href="#">Nonlinear dynamics</a>	Christian Hagendorf	22.5h +22.5h	5 Credits	1q	x	x

## Course prerequisites

A document entitled (nb: [not available](#) for this programme math2m) specifies the activities (course units - CU) with one or more pre-requisite(s) within the study programme, that is the CU whose learning outcomes must have been certified and for which the credits must have been granted by the jury before the student is authorised to sign up for that activity.

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

As the prerequisites are a requirement of enrolment, there are none within a year of a course.

The prerequisites are defined for the CUs for different years and therefore influence the order in which the student can enrol in the programme's CUs.

In addition, when the panel validates a student's individual programme at the beginning of the year, it ensures the consistency of the individual programme:

- It can change a prerequisite into a corequisite within a single year (to allow studies to be continued with an adequate annual load);
- It can require the student to combine enrolment in two separate CUs it considers necessary for educational purposes.

For more information, please consult [regulation of studies and exams](https://uclouvain.be/fr/decouvrir/rgee.html) (<https://uclouvain.be/fr/decouvrir/rgee.html>).

## The programme's courses and learning outcomes

For each UCLouvain training programme, a [reference framework of learning outcomes](#) specifies the competences expected of every graduate on completion of the programme. You can see the contribution of each teaching unit to the programme's reference framework of learning outcomes in the document "*In which teaching units are the competences and learning outcomes in the programme's reference framework developed and mastered by the student?*"

## MATH2M - Information

### Admission


*General* (<https://uclouvain.be/en/study/inscriptions/admission-requirements-master-s-degree.html>) and specific admission requirements for this program 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 Admission Requirements](#)
- > [University Bachelors](#)
- > [Non university Bachelors](#)
- > [Holders of a 2nd cycle University degree](#)
- > [Holders of a non-University 2nd cycle degree](#)
- > [Adults taking up their university training](#)
- > [Access on the file](#)
- > [Admission and Enrolment Procedures for general registration](#)

### Specific Admission Requirements

En plus de remplir les conditions d'accès décrites ci-dessous, les candidats devront apporter la preuve d'une maîtrise suffisante de la langue française (niveau B1 du CECR ([Cadre européen commun de référence](#)) ).

Les étudiants désirant accéder à la finalité didactique doivent apporter la preuve d'une maîtrise de niveau C1 du CECR.

### University Bachelors

Diploma	Special Requirements	Access	Remarks
<b>UCLouvain Bachelors</b>			
<a href="#">Bachelor in Mathematics</a>		Direct Access	
<a href="#">Bachelor in Physics</a>	Si l'étudiant a suivi la (unknown URL)	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.
<a href="#">Bachelor in Engineering</a>	Si l'étudiant a suivi la (unknown URL) 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.
<b>Others Bachelors of the French speaking Community of Belgium</b>			
		Direct Access	
<b>Bachelors of the Dutch speaking Community of Belgium</b>			
		Direct Access	
<b>Foreign Bachelors</b>			
		Based on application: accepted, conditional on further training, or refusal	



## Non university Bachelors

> Find out more about [links](https://uclouvain.be/fr/etudier/passerelles) (https://uclouvain.be/fr/etudier/passerelles) 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

### Adults taking up their university training

> See the website [Valorisation des acquis de l'expérience](https://uclouvain.be/fr/etudier/vae) (https://uclouvain.be/fr/etudier/vae)

It is possible to gain admission to all masters courses via the validation of professional experience procedure.

### Access on the file

Reminder : all Masters (apart from Advanced Masters) are also accessible on file.

## Admission and Enrolment Procedures for general registration

## Teaching method

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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

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***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 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

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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> (<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

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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

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***Attention, you are currently reading an archived page: below contact informations were for program study 2019-2020 only. To get current contact informations please got to [current program study site](#).***

## Curriculum Management

Entity	
Structure entity	SST/SC/MATH
Denomination	(MATH) ( <a href="https://uclouvain.be/repertoires/entites/math">https://uclouvain.be/repertoires/entites/math</a> )
Faculty	Faculty of Science (SC) ( <a href="https://uclouvain.be/repertoires/entites/sc">https://uclouvain.be/repertoires/entites/sc</a> )
Sector	Sciences and Technology (SST) ( <a href="https://uclouvain.be/repertoires/entites/sst">https://uclouvain.be/repertoires/entites/sst</a> )
Acronym	MATH
Postal address	Chemin du Cyclotron 2 - bte L7.01.02 1348 Louvain-la-Neuve Tel: <a href="tel:+322773452">+32 (0) 10 47 31 52</a> - Fax: <a href="tel:+322773430">+32 (0) 10 47 25 30</a>
Web site	<a href="https://uclouvain.be/fr/facultes/sc/math">https://uclouvain.be/fr/facultes/sc/math</a> ( <a href="https://uclouvain.be/fr/facultes/sc/math">https://uclouvain.be/fr/facultes/sc/math</a> )
Academic supervisor: Pascal Lambrechts	
Jury	
	<ul style="list-style-type: none"><li>• Tom Claeys</li><li>• Pedro Vaz</li></ul>
Useful Contact(s)	
	<ul style="list-style-type: none"><li>• Christine Henry de Frahan</li><li>• Julie Genbrugge</li></ul>

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