



MATH2M

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

- 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 2023-2024
- ◊ Not offered in 2023-2024 but offered the following year
- ⊕ Offered in 2023-2024 but not the following year
- △ ⊕ Not offered in 2023-2024 or the following year
- Activity with requisites
- 🌐 Open to incoming exchange students
- 🚫🌐 Not open to incoming exchange students
- [FR] Teaching language (FR, EN, ES, NL, DE, ...)

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

Year

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○ Mémoire et séminaire (28 credits)

○ LMAT2997



⌘ **Optional courses :**

These credits are not counted within the 120 required credits.

⌘ LSST1001



LIST OF FOCUSES

> [Research Focus](#) [en-prog-2023-math2m-lmath200a]

> [Teaching Focus](#) [en-prog-2023-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
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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.

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- ⊗ Optional
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- △ ⊕ Not offered in 2023-2024 or the following year
- Activity with requisites
- 🌐 Open to incoming exchange students
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[Click on the course title to see detailed informations \(objectives, methods, evaluation...\)](#)

Year

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				Year	
				1	2
⌘ LMAT2330	Seminar on the teaching of mathematics	Enrico Vitale	FR [q1+q2] [15h+30h] [4 Credits] 🌐		x
⌘ LSCI2320	Didactics and epistemology of science	Myriam De Kesel (coord.) Gabriel Dias de Carvalho Junior Stéphanie Wilmet	FR [q1] [22.5h] [2 Credits] 🌐	x	x

⌘ **Complement to the didactics and epistemology of science course (2 credits)**

2 ECTS credits among

⌘ LBIO2340C	Didactics and Epistemology of Biology - 2d degree	
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OPTIONS [40.0]

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

- > [Option in Statistics](#) [en-prog-2023-math2m-lmath221o]
- > [Option sciences actuarielles](#) [en-prog-2023-math2m-lmath222o]
- > [Option mathématiques appliquées](#) [en-prog-2023-math2m-lmath101o]
- > [Option biostatistique](#) [en-prog-2023-math2m-lmath102o]
- > [Autres cours au choix](#) [en-prog-2023-math2m-lmath100o]

OPTION IN STATISTICS [30.0]

- Mandatory
 - ⊗ Optional
 - △ Not offered in 2023-2024
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 - △ ⊕ Not offered in 2023-2024 or the following year
 - Activity with requisites
 - 🌐 Open to incoming exchange students
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OPTION SCIENCES ACTUARIELLES [30.0]

- Mandatory
- ✘ Optional
- △ Not offered in 2023-2024
- ⊖ Not offered in 2023-2024 but offered the following year
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- △ ⊕ Not offered in 2023-2024 or the following year
- Activity with requisites
- 🌐 Open to incoming exchange students
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- [FR] Teaching language (FR, EN, ES, NL, DE, ...)

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

OPTION MATHÉMATIQUES APPLIQUÉES [30.0]

- Mandatory
- ⊗ Optional
- △ Not offered in 2023-2024
- ⊖ Not offered in 2023-2024 but offered the following year
- ⊕ Offered in 2023-2024 but not the following year
- △ ⊕ Not offered in 2023-2024 or the following year
- Activity with requisites
- 🌐 Open to incoming exchange students
- 🚫🌐 Not open to incoming exchange students
- (FR) Teaching language (FR, EN, ES, NL, DE, ...)

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

Year

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o Content:

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

OPTION BIOSTATISTIQUE [30.0]

- Mandatory
- ⊗ Optional
- △ Not offered in 2023-2024
- ⊖ Not offered in 2023-2024 but offered the following year
- ⊕ Offered in 2023-2024 but not the following year
- △ ⊕ Not offered in 2023-2024 or the following year
- Activity with requisites
- 🌐 Open to incoming exchange students
- 🌐 Not open to incoming exchange students
- (FR) Teaching language (FR, EN, ES, NL, DE, ...)

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

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

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AUTRES COURS AU CHOIX

- Mandatory
- ⌘ Optional
- △ Not offered in 2023-2024
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- ⊕ Offered in 2023-2024 but not the following year
- △ ⊕ Not offered in 2023-2024 or the following year
- Activity with requisites
- 🌐 Open to incoming exchange students
- 🚫🌐 Not open to incoming exchange students
- (FR) Teaching language (FR, EN, ES, NL, DE, ...)






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

Year

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o Content:

⌘ LMAT2440	Number theory	Pierre-Emmanuel Caprace Pierre-Emmanuel Caprace (compensates Olivier Pereira)	30 [q1] [30h+15h] [5 Credits] 🌐 > <i>English-friendly</i>
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⌘ LMAT1235	Some notions of mathematical logic	Tim Van der Linden Enrico Vitale	FR [q2] [30h+15h] [5 Credits]  > English-friendly
⌘ LMAT1241	Geometry II	Pierre Bieliavsky	FR [q2] [45h+30h] [6 Credits]  > English-friendly
⌘ LMAT1271	Calculation of probability and statistical analysis	Rainer von Sachs	FR [q2] [30h+30h] [6 Credits]  > English-friendly
⌘ LMAT1371	Probability Theory	Johan Segers	FR [q2] [30h+22.5h] [5 Credits] 
⌘ LMAT1151	Numerical analysis : tools and software of calculus	Jean Van Schaftingen	FR [q1] [30h+45h] [5 Credits]  > English-friendly
⌘ LMAT1351	Approximations : methods et theory		

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.

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	
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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 [Réfor5 23e7s Titr7s et Foncion](#)

