UCLouvain

MATH2M1

2023 - 2024

Master [60] in Mathematics

At Louvain-la-Neuve - 60 credits - 1 year - Day schedule - In French
Dissertation/Graduation Project : **YES** - Internship : **NO**
Activities in English: **YES** - Activities in other languages : **NO**
Activities on other sites : **NO**
Main study domain : **Sciences**
Organized by: **Faculty of Science (SC)**
Programme acronym: **MATH2M1** - Francophone Certification Framework: 7

Table of contents

MATH2M1 - Introduction

Introduction

Introduction

The Master 60 in Mathematics offers

- a thorough education in cutting-edge fundamental mathematics;
- an interdisciplinary introduction to physics, statistics, probability, cryptography, information theory, financial mathematics, actuarial science, etc.;

  teaching based on your personal learning history;
- the possibility of moving directly to the second year of the Master 120 in mathematics and to the teacher training certificate (upper secondary education).

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.

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 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 telecommunications).

Your programme

This Master program offers a solid training in fundamental mathematics that will equip you with tools in the main mathematical disciplines. 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...).

MATH2M1 - 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: these are highly varied professions in which mathematics interacts with other fields and mathematicians collaborate with people who come from different backgrounds.

The programme offers a general education in the major 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).

As with anyone who has a university degree from UCL, 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 :

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, in depth and from a variety of viewpoints, a mathematical problem or a complex system relating to scientific disciplines other than mathematics in order to extract the essential features and relate them to the best-suited theoretical tools.

rien à ajouter

Programme structure

The programme for the Master 60 in Mathematical Sciences is composed of 60 credits over a single year of study. It includes core subjects and optional courses.

The core subjects of 20 credits, of which 18 credits are for the dissertation, are compulsory for all students.

All students complete the programme by choosing at least 40 credits from the list of courses offered.

Courses already taken in the in-depth minor in mathematical sciences may not be included in the Master programme.

MATH2M1 Programme

Detailed programme by subject

CORE COURSES [20.0]

- 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...)

LMAT2998	Mémoire		FR [] [] [18 Credits]

Sciences humaines

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

Optional courses

These credits are not counted within the 60 required credits.

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

Optional courses [40.0]

OPTIONAL COURSES [40.0]

- 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...)

Students will choose at least 15 credits from the list of courses shown below and will complete the programme with courses in the research focus or with options from the 120 credits Master in Mathematical Sciences.

Content:

LMAT2130	Partial differential equations	Heiner Olbermann	EN [q1] [30h+15h] [5 Credits]
LMAT2415	Advanced harmonic analysis	Jean Van Schaftingen	FR [q1] [30h+15h] [5 Credits]
LMAT2250	Calculus of variations		FR [q2] [30h+15h] [5 Credits] ∅ > *English-friendly*
LMAT2120	Groups theory	Pierre-Emmanuel Caprace	FR [q1] [30h+15h] [5 Credits] ⊕ > *English-friendly*
LMAT2150	Category theory	Marino Gran	EN [q1] [30h+15h] [5 Credits] > *French-friendly*
LMAT2221	Universal algebra	Enrico Vitale	FR [q2] [30h+15h] [5 Credits] ⊕ > *English-friendly*
LMAT2215	Homological algebra	Tim Van der Linden	EN [q1] [30h+15h] [5 Credits] ∅ > *French-friendly*
LMAT2430	Lie's therory elements and differential geometry	Pierre Bieliavsky	FR [q2] [30h+15h] [5 Credits]
LMAT2420	Complex analysis	Tom Claeys	EN [q2] [30h+15h] [5 Credits] > *French-friendly*
LMAT2140	Algebraic topology		EN [q1] [30h+15h] [5 Credits] ∅
LMAT2240	Low-dimensional topology	Pedro Dos Santos Santana Forte Vaz Pascal Lambrechts	EN [q2] [30h+15h] [5 Credits]
LMAT2266	Lie Theory	Timothée Marquis	FR [q1] [30h+15h] [5 Credits] ∅

Supplementary classes

To access this Master, students must have a good command of certain subjects. If this is not the case, students must take supplementary classes chosen by the faculty to satisfy course prerequisites.

- 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...)

Enseignements supplémentaires

LMAT1221	Mathematical analysis : integration	Heiner Olbermann	FR [q1] [30h+30h] [5 Credits] > English-friendly
LMAT1222	Complex analysis 1	Tom Claeys	FR [q2] [30h+15h] [5 Credits] > English-friendly
LMAT1321	Functional analysis and partial differential equations	Jean Van Schaftingen	FR [q1] [45h+45h] [7 Credits] > English-friendly
LMAT1323	Topology	Pedro Dos Santos Santana Forte Vaz	FR [q1] [30h+15h] [5 Credits] > English-friendly
LMAT1231	Multilinear algebra and group theory	Pierre-Emmanuel Caprace	FR [q1] [30h+30h] [5 Credits] > French-friendly
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	Tom Claeys	FR [q1] [30h+30h] [5 Credits] > English-friendly

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.

MATH2M1 - 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.

Unless explicitly mentioned, the bachelor's, master's and licentiate degrees listed in this table or on this page are to be understood as those issued by an institution of the French, Flemish or German-speaking Community, or by the Royal Military Academy.

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 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 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 Minor in Mathematics	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 Minor in Mathematics ou s'il 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	
Bachelier en sciences de l'ingénieur - orientation ingénieur civil		Access with additional training	
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"			
		-	
Masters			
		-	

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

Access based on application : access may be granted either directly or on the condition of completing additional courses 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

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. The interdisciplinary character of the programme is reinforced by the presence in the options of courses taken from the Masters programmes in physical sciences, in statistics and biostatistics, in actuarial science and in applied mathematics.

Evaluation

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

Students will mainly be assessed on the basis of individual work (e.g. reading, consultation of databases and bibliographic references, writing monographs and reports, presentation of seminars, dissertation and work placement). Where necessary, students will also be assessed on how much they have learned from lectures. As far as possible, there will be continuous assessment, including regular 'open book examinations'. Certain activities will not be given a precise mark but will be officially certified. Assessment of the dissertation is in two stages : a 'progress report' at the end of the first year of the Master and the final presentation.

Mobility and/or Internationalisation outlook

There is no possibility for international mobility in this course.

Possible trainings at the end of the programme

The only university training directly accessible from the 60-credits Master is the teaching certificate (30 credits). It is also possible to obtain in one year the 120 credits Master n Mathematics, which gives access to the complementary doctorate and masters programmes. The attention of students is drawn to the fact that this path requires two dissertations to be submitted and may include up to 15 credits in supplementary courses in the second year of the Master of 120 credits 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

- Tim Van der Linden
- Heiner Olbermann

Useful Contact(s)

- Catherine De Roy