## MATH1BA

*2015 - 2016*

# Bachelor in Mathematics

**At Louvain-la-Neuve - 180 credits - 3 years - Day schedule - In french**
Dissertation/Graduation Project : **NO** - Internship : **NO**
Activities in English: **YES** - Activities in other languages : **NO**
Activities on other sites : **NO**
Main study domain : **Sciences**
Organized by: **Faculté des sciences (SC)**
Programme code: **math1ba** - Francophone Certification Framework: 6

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## MATH1BA - Introduction

## Introduction

### Introduction

The Bachelor's in Mathematics offers:

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

### Your profile

You :

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

### Your future job

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

### Your programme

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

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

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

## MATH1BA -  Teaching profile

# Learning outcomes

By the end of the course the student will have acquired the knowledge of the discipline and the transferable skills needed to pursue studies in mathematics or in closely related fields (physics. statistics, actuarial science, computing). This knowledge and skill-set will also be developed by the end of the Master programme in the many and varied contexts and problems that come from other fields (economics and finance, actuarial science, statistics and biostatistics, computing and cryptography, telecommunications, biochemistry and pharmacology, physics and astronomy, climatology and meteorology).

The programme offers a broad education in the fundamental fields of mathematics and an introduction to closely related fields (especially physics, but also statistics, applied mathematics, and computing).

During the Bachelor programme, future graduates in mathematics will be able to bring to bear a critical, constructive and innovative view on the present-day world and its problems. They will have developed their educational and personal plans, which they will pursue during the Master programme with increasing independence.

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

1) recognise and understand a basic foundation of mathematics.

- Choose and use the basic tools of calculation to solve mathematical problems.
- Recognise the fundamental concepts of important current mathematical theories.
- Establish the main connections between these theories, analyse them and explain them through the use of examples.

2) identify, by use of the abstract and experimental approach specific to the exact sciences, the unifying features of different situations and experiments in mathematics or in closely related fields (probability and statistics, physics, computing).

- Follow an abstract reasoning in order to solve problems concerning mathematics and their applications.

3) show evidence of abstract thinking and of a critical spirit.

- Argue within the context of the axiomatic method Recognise the key arguments and the structure of a proof.
- Construct and draw up a proof independently.
- Evaluate the rigour of a mathematical or logical argument and identify any possible flaws in it.
- Distinguish between the intuition and the validity of a result and the different levels of rigorous understanding of this same result.

4) communicate in a clear, precise and rigorous way, in French and in English.

- Write a mathematical text in French according to the conventions of the discipline.
- Structure an oral presentation in French, highlight key elements, identify techniques and concepts and adapt the presentation to the listeners' level of understanding.
- Communicate in English (level C1 for reading comprehension, level B2 for listening comprehension and for oral and written expression, CEFR).

5) learn in an independent manner.

- Find relevant sources in the mathematical literature.
- Read and understand an advanced mathematical text and locate it correctly in relation to knowledge acquired.

# Programme structure

The programme leading to the Bachelor in Mathematics is composed of 180 credits spread over three years of study and organised as follows:

• a general education, called the major, of 150 credits;
• a minor of 30 credits.

The major includes the following subjects:

• disciplinary courses: analysis, algebra, geometry;
• courses in closely related disciplines: physics, mechanics, computing and numerical analysis, probability and statistics;
• seminar on mathematical current events and on physics in the first year, review work in the third year;
• introductory courses (one course to be chosen): biology, chemistry, earth sciences, economics;
• human sciences (philosophy and religious studies) and languages.

The first-year programme (60 credits in the major) is identical to that for the first year of Bachelor in Physics. At the end of the first year, there is automatic authorisation for transfer to the Bachelor in Physical Sciences.

In the second and third years, students complete their major programme (50 credits in the second year and 40 credits in the third) either with the additional module minor in mathematics or with another minor to which they have access, chosen on the basis of a project developed in conjunction with their study adviser.

Students who have a degree with more than three years of study, and especially those with a teacher training certificate (upper secondary education), may request personalised admission so as to benefit from a reduced programme. Their programme will be established in conjunction with the study adviser on the basis of the skills the student has already acquired.

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## MATH1BA Detailled programme

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# Programme by subject

|  |  |  |  |  |  | Year | | |
|---|---|---|---|---|---|---|---|---|
|  |  |  |  |  |  | 1 | 2 | 3 |

### ○ *Majeure (150 credits)*

#### ○ Analyse (43 credits)

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| ○ LMAT1121 | Mathematical analysis 1 | Augusto Ponce, Jean Van Schaftingen | 30h+30h | 5 Credits | 1q | x | | |
| ○ LMAT1122 | Mathematical analysis 2 | Augusto Ponce, Jean Van Schaftingen | 30h+30h | 5 Credits | 2q | x | | |
| ○ LMAT1221 | Mathematical analysis 3 🔲 | Augusto Ponce, Jean Van Schaftingen | 45h+45h | 9 Credits | 1q | | x | |
| ○ LMAT1222 | Complex analysis 🔲 | Luc Haine | 30h+15h | 5 Credits | 2q | | x | |
| ○ LMAT1223 | Differential equations 🔲 | Jean Van Schaftingen | 30h+15h | 5 Credits | 2q | | x | |
| ○ LMAT1321 | Functional analysis and partial differential equations 🔲 | Michel Willem | 45h+45h | 7 Credits | 1q | | | x |
| ○ LMAT1322 | Measure theory 🔲 | Paolo Roselli | 22.5h +15h | 3 Credits | 1q | | | x |
| ○ LMAT1323 | Topology | Yves Félix | 22.5h +15h | 4 Credits | 1q | | x | |

#### ○ Algèbre et géométrie (36 credits)

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| ○ LMAT1131 | Linear Algebra | Enrico Vitale | 45h+45h | 8 Credits | 1q | x | | |
| ○ LMAT1231 | Multilinear algebra and group theory 🔲 | Marino Gran | 30h+30h | 6 Credits | 2q | | x | |
| ○ LMAT1331 | Commutative algebra 🔲 | Jean-Pierre Tignol | 45h | 4 Credits | 2q | | | x |
| ○ LMAT1141 | Geometry I | Pascal Lambrechts | 45h+30h | 7 Credits | 2q | x | | |
| ○ LMAT1241 | Geometry II 🔲 | Pierre Bieliavsky | 45h+15h | 6 Credits | 1q | | x | |
| ○ LMAT2110 | Eléments de géométrie différentielle 🔲 | Luc Haine | 30h+30h | 5 Credits | 1q | | | x |

#### ○ Physique et mécanique (26 credits)

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| ○ LPHY1111 | General Physics 1 | Jan Govaerts, Vincent Lemaitre | 45h+45h | 8 Credits | 1q | x | | |

| | | | | | | | Year | | |
| --- | --- | --- | --- | --- | --- | --- | :-: | :-: | :-: |
| | | | | | | | 1 | 2 | 3 |
| ⚙ LPHY1112 | General Physics 2 | Jan Govaerts, Vincent Lemaitre | 45h+45h | 8 Credits | 2q | x | | |
| ⚙ LMAT1161 | Mathematical methods in classical mathematics 1 | Christian Hagendorf, Luc Haine | 22.5h +30h | 5 Credits | 2q | x | | |
| ⚙ LMAT1261 | Mathematical methods of classic mechanics 2 📙 | Christian Hagendorf, Luc Haine | 22.5h +30h | 5 Credits | 1q | | x | |

## ⚙ Informatique et analyse numérique (11 crédits)

| | | | | | | | | | |
| --- | --- | --- | --- | --- | --- | --- | :-: | :-: | :-: |
| ⚙ LMAT1151 | Numerical analysis : tools and software of calculus | Tom Claeys | 30h+45h | 6 Credits | 2q | x | | |
| ⚙ LINMA2171 | Numerical Analysis : Approximation, Interpolation, Integration 📙 | Pierre-Antoine Absil | 30h +22.5h | 5 Credits | 1q | | | x |

## ⚙ Probabilités et statistiques (11 credits)

| | | | | | | | | | |
| --- | --- | --- | --- | --- | --- | --- | :-: | :-: | :-: |
| ⚙ LMAT1271 | Calculation of probability and statistical analysis 📙 | Catherine Timmermans (compensates Rainer von Sachs), Rainer von Sachs | 30h+30h | 6 Credits | 2q | | x | |
| ⚙ LMAT1371 | Probability 📙 | Johan Segers | 30h +22.5h | 5 Credits | 2q | | | x |

## ⚙ Séminaires et travaux de synthèse (7 credits)

| | | | | | | | | | |
| --- | --- | --- | --- | --- | --- | --- | :-: | :-: | :-: |
| ⚙ LMAT1381 | Personal project and seminary 📙 | Marino Gran, Augusto Ponce | 30h | 7 Credits | 2q | | | x |

## ⚙ Anglais (7 credits)

| | | | | | | | | | |
| --- | --- | --- | --- | --- | --- | --- | :-: | :-: | :-: |
| ⚙ LANG1861 | English: reading and listening comprehension of scientific texts | Ahmed Adrioueche (coord.), Catherine Avery (compensates Fanny Desterbecq), Fanny Desterbecq, Sandrine Meirlaen (compensates Charlotte Peters), Charlotte Peters, Annick Sonck  (coord.) | 10h | 3 Credits | 2q | x | | |
| ⚙ LANG1862 | English: reading and listening comprehension of scientific texts 📙 | Ahmed Adrioueche (coord.), Isabelle Druant, Sandrine Meirlaen (compensates Isabelle Druant), Annick Sonck, Anne-Julie Toubeau (compensates Isabelle Druant) | 30h | 2 Credits | 1q | | x | |
| ⚙ LANG1863 | English for Political Science (Upper-Intermediate level) 📙 | Ahmed Adrioueche (coord.), Julie Crombois (compensates Fanny Desterbecq), Fanny Desterbecq (coord.), Marielle Henriet (coord.), Susan Jackman, Sandrine Jacob (compensates Susan Jackman), Sabrina Knorr  (coord.), Nevin Serbest, Colleen Starrs, Françoise Stas  (coord.), Shaïma Wasfy (compensates Sabrina Knorr) | 30h | 2 Credits | 1 ou 2q | | | x |

Year
1 2 3

## Actualités des mathématiques et de la physique (2 credits)

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| LMAFY1181 | Actualities in Mathematics and Physics | Pascal Lambrechts, Bernard Piraux | 15h | 2 Credits | 1 + 2q | x | | |

## Cours au choix
*Students choose at least 3 credits from the following courses*

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| LBIO1114 | Introduction to biology | Patrick Dumont, Caroline Nieberding | 30h+7.5h | 3 Credits | 2q | x | | |
| LCHM1112 | General Chemistry | Yaroslav Filinchuk | 22.5h +22.5h | 3 Credits | 1q | x | | |
| LBIR1130A | Introduction to Earth sciences | Pierre Delmelle, Philippe Sonnet | 30h | 3 Credits | 2q | x | | |
| LCOPS1115 | Economic Policy | Tanguy Isaac, Arastou Khatibi | 45h+15h | 5 Credits | 1 ou 2q | x | | |

## Sciences humaines (4 credits)

### Students choose 2 credits from the following courses
*De 2 à 4 credits parmi*

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| LFILO1250 | Logic | Peter Verdée | 45h+15h | 4 Credits | 2q | | x | |
| LSC1120 | Philosophy | Bernard Feltz | 30h | 2 Credits | 1q | | x | |

### Sciences religieuses (2 credits)
*Students choose 2 credits from the following courses*

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| LTECO2100 | Questions of religious sciences: Biblical readings | Hans Ausloos | 15h | 2 Credits | 1q | | | x |
| LTECO2200 | Questions of religious sciences: reflections about Christian faith | Dominique Martens | 15h | 2 Credits | 2q | | | x |
| LTECO2300 | Questions of religious sciences: questions about ethics | Marcela Lobo Bustamante | 15h | 2 Credits | 1q | | | x |

## *Mineure (30 crédits) (30 credits)*

While taking care to attain the 60 credits per year required, students complete their course either with the additional module minor in mathematics or with a minor chosen from the UCL programme.

### Mineure ou approfondissement au choix (30 credits)
*Students choose courses depending on the restrictions related to the minor and in conjunction with their study adviser.*

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | Cours de 2e bloc annuel | N. | | Credits | | | x | |
| | Cours de 3e bloc annuel | N. | | Credits | | | | x |

# List of available minors

Students will choose the additional module minor in mathematics or another introductory and/or access minor arranged by the University.

> Additionnal module in Mathematics  *[ https://www.uclouvain.be/en-prog-2015-app-lmath100p ]*
> Mineure en Antiquité : Égypte, Orient, Grèce, Rome  *[ https://www.uclouvain.be/en-prog-2015-min-lanti100i ]*
> Mineure en droit (accès)  *[ https://www.uclouvain.be/en-prog-2015-min-ladrt100i ]*
> Mineure en droit (ouverture)  *[ https://www.uclouvain.be/en-prog-2015-min-lodrt100i ]*
> Mineure en sciences biomédicales (ouverture)  *[ https://www.uclouvain.be/en-prog-2015-min-wsbim100i ]*
> Minor in Arabic language and Islamic civilization  *[ https://www.uclouvain.be/en-prog-2015-min-lisla100i ]*
> Minor in Chinese studies  *[ https://www.uclouvain.be/en-prog-2015-min-lchin100i ]*
> Minor in Computer Sciences  *[ https://www.uclouvain.be/en-prog-2015-min-linfo100i ]*
> Minor in Culture and Creation  *[ https://www.uclouvain.be/en-prog-2015-min-lcucr100i ]*
> Minor in Development and Environment  *[ https://www.uclouvain.be/en-prog-2015-min-ldenv100i ]*
> Minor in Economics  *[ https://www.uclouvain.be/en-prog-2015-min-lecon100i ]*
> Minor in Economics (open)  *[ https://www.uclouvain.be/en-prog-2015-min-loeco100i ]*
> Minor in Education (*)  *[ https://www.uclouvain.be/en-prog-2015-min-lfopa100i ]*
> Minor in Engineering Sciences : biomedical  *[ https://www.uclouvain.be/en-prog-2015-min-lgbio100i ]*
> Minor in Engineering Sciences: Applied Mathematics  *[ https://www.uclouvain.be/en-prog-2015-min-lmap100i ]*
> Minor in Engineering Sciences: Mechanics  *[ https://www.uclouvain.be/en-prog-2015-min-lmeca100i ]*
> Minor in European Studies  *[ https://www.uclouvain.be/en-prog-2015-min-leuro100i ]*
> Minor in French Studies (*)  *[ https://www.uclouvain.be/en-prog-2015-min-lfran100i ]*
> Minor in Gender Studies  *[ https://www.uclouvain.be/en-prog-2015-min-lgenr100i ]*
> Minor in Geography  *[ https://www.uclouvain.be/en-prog-2015-min-lgeog100i ]*
> Minor in History  *[ https://www.uclouvain.be/en-prog-2015-min-lhist100i ]*
> Minor in History of Art and Archeology  *[ https://www.uclouvain.be/en-prog-2015-min-larke100i ]*
> Minor in Human and Social Sciences  *[ https://www.uclouvain.be/en-prog-2015-min-lhuso100i ]*
> Minor in Information and Communication (*)  *[ https://www.uclouvain.be/en-prog-2015-min-lcomu100i ]*
> Minor in Linguistics  *[ https://www.uclouvain.be/en-prog-2015-min-lling100i ]*
> Minor in Literary Studies  *[ https://www.uclouvain.be/en-prog-2015-min-llitt100i ]*
> Minor in Mangement (basic knowledge)  *[ https://www.uclouvain.be/en-prog-2015-min-lgesa100i ]*
> Minor in Medieval Studies  *[ https://www.uclouvain.be/en-prog-2015-min-lmedi100i ]*
> Minor in Musicology  *[ https://www.uclouvain.be/en-prog-2015-min-lmusi100i ]*
> Minor in Oriental Studies  *[ https://www.uclouvain.be/en-prog-2015-min-lori100i ]*
> Minor in Philosophy  *[ https://www.uclouvain.be/en-prog-2015-min-lisp100i ]*
> Minor in Physics  *[ https://www.uclouvain.be/en-prog-2015-min-lphys100i ]*
> Minor in Political Sciences  *[ https://www.uclouvain.be/en-prog-2015-min-lspol100i ]*
> Minor in Population and Development Studies  *[ https://www.uclouvain.be/en-prog-2015-min-lsped100i ]*
> Minor in Scientific Culture  *[ https://www.uclouvain.be/en-prog-2015-min-lcusc100i ]*
> Minor in Sociology and Anthropology  *[ https://www.uclouvain.be/en-prog-2015-min-lsoca100i ]*
> Minor in Statistics  *[ https://www.uclouvain.be/en-prog-2015-min-lstat100i ]*
> Minor in Theology  *[ https://www.uclouvain.be/en-prog-2015-min-ltheo100i ]*
> Minor in Urban Architecture  *[ https://www.uclouvain.be/en-prog-2015-min-larch100i ]*
> Minor in entrepreneurship (*)  *[ https://www.uclouvain.be/en-prog-2015-min-lmpme100i ]*

*(*) This program is the subject of access criteria*

# Course prerequisites

A document entitled en-prerequis-2015-math1ba.pdf 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.

# The programme's courses and learning outcomes

For each UCL 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?"

The document is available by clicking this link after being authenticated with UCL account.

# Programme type

## MATH1BA - 1ST ANNUAL UNIT

| | |
|---|---|
| ⊙ Mandatory | ⊗ Optional |
| △ Courses not taught during 2015-2016 | ⊘ Periodic courses not taught during 2015-2016 |
| ⊕ Periodic courses taught during 2015-2016 | 🟨 Activity with requisites |

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

### ⊙ *Majeure*

#### ⊙ **Analyse**

| | | | | | |
|---|---|---|---|---|---|
| ⊙ LMAT1121 | Mathematical analysis 1 | Augusto Ponce, Jean Van Schaftingen | 30h+30h | 5 Credits | 1q |
| ⊙ LMAT1122 | Mathematical analysis 2 | Augusto Ponce, Jean Van Schaftingen | 30h+30h | 5 Credits | 2q |

#### ⊙ **Algèbre et géométrie**

| | | | | | |
|---|---|---|---|---|---|
| ⊙ LMAT1131 | Linear Algebra | Enrico Vitale | 45h+45h | 8 Credits | 1q |
| ⊙ LMAT1141 | Geometry I | Pascal Lambrechts | 45h+30h | 7 Credits | 2q |

#### ⊙ **Physique et mécanique**

| | | | | | |
|---|---|---|---|---|---|
| ⊙ LPHY1111 | General Physics 1 | Jan Govaerts, Vincent Lemaitre | 45h+45h | 8 Credits | 1q |
| ⊙ LPHY1112 | General Physics 2 | Jan Govaerts, Vincent Lemaitre | 45h+45h | 8 Credits | 2q |
| ⊙ LMAT1161 | Mathematical methods in classical mathematics 1 | Christian Hagendorf, Luc Haine | 22.5h +30h | 5 Credits | 2q |

#### ⊙ **Informatique et analyse numérique (11 crédits)**

| | | | | | |
|---|---|---|---|---|---|
| ⊙ LMAT1151 | Numerical analysis : tools and software of calculus | Tom Claeys | 30h+45h | 6 Credits | 2q |

## ○ Anglais

| | | | | | |
|---|---|---|---|---|---|
| ○ LANG1861 | English: reading and listening comprehension of scientific texts | Ahmed Adrioueche (coord.), Catherine Avery (compensates Fanny Desterbecq), Fanny Desterbecq, Sandrine Meirlaen (compensates Charlotte Peters), Charlotte Peters, Annick Sonck  (coord.) | 10h | 3 Credits | 2q |

## ○ Actualités des mathématiques et de la physique

| | | | | | |
|---|---|---|---|---|---|
| ○ LMAFY1181 | Actualities in Mathematics and Physics | Pascal Lambrechts, Bernard Piraux | 15h | 2 Credits | 1 + 2q |

## ○ Cours au choix

*Students choose at least 3 credits from the following courses*

| | | | | | |
|---|---|---|---|---|---|
| ✕ LBIO1114 | Introduction to biology | Patrick Dumont, Caroline Nieberding | 30h+7.5h | 3 Credits | 2q |
| ✕ LCHM1112 | General Chemistry | Yaroslav Filinchuk | 22.5h +22.5h | 3 Credits | 1q |
| ✕ LBIR1130A | Introduction to Earth sciences | Pierre Delmelle, Philippe Sonnet | 30h | 3 Credits | 2q |
| ✕ LCOPS1115 | Economic Policy | Tanguy Isaac, Arastou Khatibi | 45h+15h | 5 Credits | 1 ou 2q |

## MATH1BA - 2ND ANNUAL UNIT

○ Mandatory  ⌘ Optional
△ Courses not taught during 2015-2016  ⊘ Periodic courses not taught during 2015-2016
⊕ Periodic courses taught during 2015-2016  🟨 Activity with requisites

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

### ○ *Majeure*

#### ○ Analyse

| | | | | | |
|---|---|---|---|---|---|
| ○ LMAT1221 | Mathematical analysis 3 🟨 | Augusto Ponce, Jean Van Schaftingen | 45h+45h | 9 Credits | 1q |
| ○ LMAT1222 | Complex analysis 🟨 | Luc Haine | 30h+15h | 5 Credits | 2q |
| ○ LMAT1223 | Differential equations 🟨 | Jean Van Schaftingen | 30h+15h | 5 Credits | 2q |
| ○ LMAT1323 | Topology | Yves Félix | 22.5h +15h | 4 Credits | 1q |

#### ○ Algèbre et géométrie

| | | | | | |
|---|---|---|---|---|---|
| ○ LMAT1231 | Multilinear algebra and group theory 🟨 | Marino Gran | 30h+30h | 6 Credits | 2q |
| ○ LMAT1241 | Geometry II 🟨 | Pierre Bieliavsky | 45h+15h | 6 Credits | 1q |

#### ○ Physique et mécanique

| | | | | | |
|---|---|---|---|---|---|
| ○ LMAT1261 | Mathematical methods of classic mechanics 2 🟨 | Christian Hagendorf, Luc Haine | 22.5h +30h | 5 Credits | 1q |

#### ○ Probabilités et statistiques

| | | | | | |
|---|---|---|---|---|---|
| ○ LMAT1271 | Calculation of probability and statistical analysis 🟨 | Catherine Timmermans (compensates Rainer von Sachs), Rainer von Sachs | 30h+30h | 6 Credits | 2q |

#### ○ Anglais

| | | | | | |
|---|---|---|---|---|---|
| ○ LANG1862 | English: reading and listening comprehension of scientific texts 🟨 | Ahmed Adrioueche (coord.), Isabelle Druant, Sandrine Meirlaen (compensates Isabelle Druant), Annick Sonck, Anne-Julie Toubeau (compensates Isabelle Druant) | 30h | 2 Credits | 1q |

#### ○ Sciences humaines

##### ○ Students choose 2 credits from the following courses
*De 2 à 4 credits parmi*

| | | | | | |
|---|---|---|---|---|---|
| ⌘ LFILO1250 | Logic | Peter Verdée | 45h+15h | 4 Credits | 2q |
| ⌘ LSC1120 | Philosophy | Bernard Feltz | 30h | 2 Credits | 1q |

### ○ *Mineure (30 crédits)*

*While taking care to attain the 60 credits per year required, students complete their course either with the additional module minor in mathematics or with a minor chosen from the UCL programme.*

#### ⌘ Mineure ou approfondissement au choix
*Students choose courses depending on the restrictions related to the minor and in conjunction with their study adviser.*

| | | | | | |
|---|---|---|---|---|---|
| ○ | Cours de 2e bloc annuel | N. | | Credits | |

## MATH1BA - 3RD ANNUAL UNIT

○ Mandatory　　　　　　　　　　　　　　　　⊗ Optional
△ Courses not taught during 2015-2016　　　⊘ Periodic courses not taught during 2015-2016
⊕ Periodic courses taught during 2015-2016　　🟨 Activity with requisites

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

### ○ *Majeure*

#### ○ Analyse

| | | | | | |
|---|---|---|---|---|---|
| ○ LMAT1321 | Functional analysis and partial differential equations 🟨 | Michel Willem | 45h+45h | 7 Credits | 1q |
| ○ LMAT1322 | Measure theory 🟨 | Paolo Roselli | 22.5h +15h | 3 Credits | 1q |

#### ○ Algèbre et géométrie

| | | | | | |
|---|---|---|---|---|---|
| ○ LMAT1331 | Commutative algebra 🟨 | Jean-Pierre Tignol | 45h | 4 Credits | 2q |
| ○ LMAT2110 | Eléments de géométrie différentielle 🟨 | Luc Haine | 30h+30h | 5 Credits | 1q |

#### ○ Informatique et analyse numérique (11 crédits)

| | | | | | |
|---|---|---|---|---|---|
| ○ LINMA2171 | Numerical Analysis : Approximation, Interpolation, Integration 🟨 | Pierre-Antoine Absil | 30h +22.5h | 5 Credits | 1q |

#### ○ Probabilités et statistiques

| | | | | | |
|---|---|---|---|---|---|
| ○ LMAT1371 | Probability 🟨 | Johan Segers | 30h +22.5h | 5 Credits | 2q |

#### ○ Séminaires et travaux de synthèse

| | | | | | |
|---|---|---|---|---|---|
| ○ LMAT1381 | Personal project and seminary 🟨 | Marino Gran, Augusto Ponce | 30h | 7 Credits | 2q |

#### ○ Anglais

| | | | | | |
|---|---|---|---|---|---|
| ○ LANG1863 | English for Political Science (Upper-Intermediate level) 🟨 | Ahmed Adrioueche (coord.), Julie Crombois (compensates Fanny Desterbecq), Fanny Desterbecq (coord.), Marielle Henriet (coord.), Susan Jackman, Sandrine Jacob (compensates Susan Jackman), Sabrina Knorr (coord.), Nevin Serbest, Colleen Starrs, Françoise Stas (coord.), Shaïma Wasfy (compensates Sabrina Knorr) | 30h | 2 Credits | 1 ou 2q |

### ○ Sciences humaines

#### ○ Sciences religieuses
*Students choose 2 credits from the following courses*

| | | | | | |
|---|---|---|---|---|---|
| ⊗ LTECO2100 | Questions of religious sciences: Biblical readings | Hans Ausloos | 15h | 2 Credits | 1q |
| ⊗ LTECO2200 | Questions of religious sciences: reflections about Christian faith | Dominique Martens | 15h | 2 Credits | 2q |
| ⊗ LTECO2300 | Questions of religious sciences: questions about ethics | Marcela Lobo Bustamante | 15h | 2 Credits | 1q |

## Mineure (30 crédits)

*While taking care to attain the 60 credits per year required, students complete their course either with the additional module minor in mathematics or with a minor chosen from the UCL programme.*

### Mineure ou approfondissement au choix
*Students choose courses depending on the restrictions related to the minor and in conjunction with their study adviser.*

| | Cours de 3e bloc annuel | N. | | Credits | |
|---|---|---|---|---|---|

## MATH1BA - Information

## Admission

Decree of 7 November 2013 defining the landscape of higher education and the academic organization of studies.
The admission requirements must be met prior to enrolment in the University.

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

> General requirements
> Specific requirements
> Knowledge of the French language exam
> Special requirements

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### General requirements

Except as otherwise provided by other specific legal provisions, admission to undergraduate courses leading to the award of a Bachelor's degree will be granted to students with one of the following qualifications :

1. A Certificate of Upper Secondary Education issued during or after the 1993-1994 academic year by an establishment offering full-time secondary education or an adult education centre in the French Community of Belgium and, as the case may be, approved if it was issued by an educational institution before 1 January 2008 or affixed with the seal of the French Community if it was issued after this date, or an equivalent certificate awarded by the Examination Board of the French Community during or after 1994;

2. A Certificate of Upper Secondary Education issued no later than the end of the 1992-1993 academic year, along with official documentation attesting to the student's ability to pursue higher education for students applying for a full-length undergraduate degree programme;

3. A diploma awarded by a higher education institution within the French Community that confers an academic degree issued under the above-mentioned Decree, or a diploma awarded by a university or institution dispensing full-time higher education in accordance with earlier legislation;

4. A higher education certificate or diploma awarded by an adult education centre;

5. A pass certificate for one of the entrance examinations organized by higher education institutions or by an examination board of the French Community; this document gives admission to studies in the sectors, fields or programmes indicated therein;

6. A diploma, certificate of studies or other qualification similar to those mentioned above, issued by the Flemish Community of Belgium (this qualification does not grant exemption from the French language proficiency examination), the German Community of Belgium or the Royal Military Academy;

7. A diploma, certificate of studies or other qualification obtained abroad and deemed equivalent to the first four mentioned above by virtue of a law, decree, European directive or international convention;

Note:

Requests for equivalence must be submitted no later than 14 July 2015 to the Equivalence department (Service des équivalences) of the Ministry of Higher Education and Scientific Research of the French Community of Belgium.

The following two qualifications are automatically deemed equivalent to the Certificate of Upper Secondary Education (Certificat d'enseignement secondaire supérieur – CESS):

- European Baccalaureate issued by the Board of Governors of a European School,

- International Baccalaureate issued by the International Baccalaureate Office in Geneva.

These two qualifications do not, however, provide automatic exemption from the French language proficiency examination.

8. Official documentation attesting to a student's ability to pursue higher education (diplôme d'aptitude à accéder à l'enseignement supérieur - DAES), issued by the Examination Board of the French Community.

**Specific requirements**

**Admission to undergraduate studies on the basis of accreditation of knowledge and skills obtained through professional or personal experience (Accreditation of Prior Experience)**

Subject to the general requirements laid down by the authorities of the higher education institution, with the aim of admission to the undergraduate programme, the examination boards accredit the knowledge and skills that students have obtained through their professional or personal experience.

This experience must correspond to at least five years of documented activity, with years spent in higher education being partially taken into account: 60 credits are deemed equivalent to one year of experience, with a maximum of two years being counted. At the end of an assessment procedure organized by the authorities of the higher education institution, the Examination Board will decide whether a student has sufficient skills and knowledge to successfully pursue undergraduate studies.

After this assessment, the Examination Board will determine the additional courses and possible exemptions constituting the supplementary requirements for the student's admission.

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**Exam of knowledge of the French language**

Anyone not demonstrating sufficient French language proficiency will not be admitted to the first-year undergraduate examinations.

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## Special requirements

- Admission to **undergraduate studies in engineering: civil engineering and architect**

  Pass certificate for the special entrance examination for undergraduate studies in engineering: civil engineering and architect.

  Admission to these courses is always subject to students passing the special entrance examination. Contact the faculty office for the programme content and the examination arrangements.
- Admission to **undergraduate studies in veterinary medicine**

  Admission to undergraduate studies in veterinary medicine is governed by the Decree of 16 June 2006 regulating the number of students in certain higher education undergraduate courses (non-residents).
- Admission to **undergraduate studies in physiotherapy and rehabilitation**

  Admission to undergraduate studies in physiotherapy and rehabilitation is governed by the Decree of 16 June 2006 regulating the number of students in certain higher education undergraduate courses (non-residents).
- Admission to **undergraduate studies in psychology and education: speech and language therapy**

  Admission to undergraduate studies in psychology and education: speech and language therapy is governed by the Decree of 16 June 2006 regulating the number of students in certain higher education undergraduate courses (non-residents).
- Admission to **undergraduate studies in medicine and dental science**

  Admission to undergraduate studies in medecine and dental science is governed by the Decree of 16 June 2006 regulating the number of students in certain higher education undergraduate courses (non-residents).

  Note: students wishing to enrol for a Bachelor's degree in Medicine must first sit an aptitude test.

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# Teaching method

Whenever possible, teachers in the School of Mathematics give priority to close supervision: small-group work, individual tuition, rapid and personalised feedback on activities, active participation of students in the School's teaching decisions. All the courses in the programme contribute to the acquisition of skills such as the capacity for abstract thinking and for reasoning. Other skills (aptitude for communication, independent learning, document research) are especially exercised in the third-year review work.

In the first year, tutorial sessions allow those students who wish to do so to take stock of topics considered in the course in a personalised way with the help of teachers. The Faculty also holds sessions on the issue of working methods as well as on ways of approaching different subjects and on time management.

For the three years, exercise sessions and laboratory sessions are held in small groups accompanied by assistants. Individual and/or group work is expected for some activities, especially in the third-year review work, with the help of assistants or teachers. Internet sites (the iCampus platform) are linked to most courses: they contain useful information as well as syllabi and other documents vital for students' work.

# Evaluation

*The evaluation methods comply with the regulations concerning studies and exams. More detailed explanation of the modalities specific to each learning unit are available on their description sheets under the heading "Learning outcomes evaluation method".*

Assessment methods conform to academic regulations and procedures. More details on the methods employed in each teaching unit are available in their description sheet, under the heading 'Assessment methods for student learning'.

Different methods are in place in order to evaluate the knowledge and skills acquired in the course of the learning period; these are adapted to the following types of performance: continuous assessment, especially for practical exercises; assessment of personal work (reading, consultation of databases and bibliographical references, monograph and report writing); overall assessment (written and/or oral) during examination sessions; assessment of public presentations.

In the first year, compulsory tests contributing to the final mark for each subject are held one month after the beginning of classes in the first semester.

# Mobility and/or Internationalisation outlook

Apart from exceptional cases, international mobility is recommended only in the Master programme. Students in the third year of the Bachelor will take care to participate in information sessions held for them by the Faculty from the first semester, so as to present their application file in conformity with the respective deadlines for the different types of mobility.

The Bachelor in Mathematics allows access to the following programmes:

- Master [120] in Mathematics, research or teaching focus;
- Master [60] in Mathematics;
- Master [120] en statistics, general ou Master [120] in statistics, biostatistics;
- Master [120] en sciences actuarielles.

**Other training accessible at the end of the programme**

With the choice of an appropriate minor and/or a programme of complementary training, the Bachelor in Mathematics allows access to certain course choices of Master [120] in physics, du Master [120] in computer science ou du Master [120] in economics, general.

# Possible trainings at the end of the programme

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# Contacts

## Curriculum Managment

Entite de la structure MATH

|  |  |
| --- | --- |
| Acronyme | **MATH** |
| Dénomination | Ecole de mathématique |
| Adresse | Chemin du Cyclotron 2 bte L7.01.02 |

|  | 1348 Louvain-la-Neuve |
| --- | --- |
|  | Tél 010 47 31 52 - Fax 010 47 25 30 |
| Site web | https://www.uclouvain.be/math |
| Secteur | Secteur des sciences et technologies (SST) |
| Faculté | Faculté des sciences (SC) |
| Commission de programme | Ecole de mathématique (MATH) |

**Academic Supervisor :**  Enrico Vitale

**Jury:**

Président des jurys de 2ème et de 3ème année : Pascal Lambrechts

Secrétaire des jurys de 2ème et de 3ème année : Marino Gran

# Usefull Contacts

Secrétaire de l'Ecole de mathématique : Roseline Van Dyck