

Faculty of Sciences



MATH1BA Baccalauréat en sciences mathématiques (Bachelor of Mathematical Sciences)



Study objectives

The Bachelor programme aims at the acquisition of the basic knowledge and skills within the fundamental disciplines of Mathematics (Algebra, Analysis, Numerical Calculations, Geometry, Probability) in relation with their applications such as Physics, Computing and Statistics. Special attention is given to rigour in reasoning and written and oral expression, as well as to the capacities of abstraction and modelling.

General presentation of the programme

The first year is in common with the bachelor programme in Physical Sciences. From the second year on, the students are encouraged to choose a minor or to complete their programme with additional options. Minors are offered in Computing Science, Statistics, Applied Mathematics, Physics and Economics. The student may also choose another minor from the University programme, based on a project to be elaborated together with the study advisor.

The activities offered include theoretical courses, exercises sessions, tasks, active participation in a seminar and the written summary of a given work task.

Language courses accompany the programme and aim at the mastery of scientific English.

Principal Subjects

Analysis : 43 credits

- Mathematical Analysis 1 (30-30) (5 credits)
- Mathematical Analysis 2 (30-30) (5 credits)
- Mathematical Analysis 3 (45-45) (9 credits)
- Complex Analysis (30-15) (5 credits)
- Differential Equations (30-15) (5 credits)
- Functional Analysis and Equations with partial derivations (45-45) (8 credits)
- Theory of Measure (22,5-15) (3 credits)
- Topology (22.5-15) (3 credits)

The " Analysis 1-2-3 " courses must be followed in the order indicated. The " Complex Analysis " and " Differential Equations " courses may be followed independently after " Analysis 2 ". The " Functional Analysis and EDP ", " Theory of Measure " and " Topology " courses may be followed independently after " Analysis 3 ".

Algebra and Geometry : 31 credits

- Linear Algebra (45-45) (8 credits)
- Multilinear Algebra and Theory of Groups (30-30) (6 credits)
- Commutative Algebra (45-0) (4 credits)
- Geometry1 (45-30) (7 credits)
- Geometry 2 (45-15) (6 credits)

The " Algebra 2 " and " Algebra 3 " courses may be followed independently after " Algebra 1 ". The " Geometry 1 " and " Geometry 2 " courses must be followed in order, after " Algebra 1 " and " Algebra 2 " respectively.

Physics and Mechanics : 26 credits

- General Physics 1 (45-45) (8 credits)
- General Physics 2 (45-45) (8 credits)
- Mathematical Methods in Classical Mechanics 1 (22.5-30) (5 credits)
- Mathematical Methods in Classical Mechanics 2 (22.5-30) (5 credits)

The " Physics 1 " and " Physics 2 " courses must be followed in order, just as the " Mechanics 1 " and the " Mechanics 2 " courses. The " Mechanics 1 " course must follow the " Physics 1 " course.

Computing Studies and Numerical Analysis : 18 credits

- Numerical Calculations : Methods and Software Tools (30-45) (7 credits)
- Numerical Analysis (22.5-30) (5 credits)
- Algorithmics and Programmation I (30-30) (6 credits)

The " Numerical Calculations " and " Numerical Analysis " courses must be followed in order. The " Algorithmics and Programmation I " course may be followed independently of the others.

Probability-Statistics : 11 credits

- Calculation of Probability and Statistical Analysis (30-30) (6 credits)
- Probability (30-22.5) (5 credits)

These courses must be followed in order.

Actualities in Mathematics and Physics (15) (2 credits)

Seminars and Summary writing : 8 credits

English : 6 credits

- English 1 (portfolio of texts) (2 credits)
- English 2 (30-0) (2 credits)
- English 3 (30-0) (2 credits)

These courses must be followed in order (except in the case of special exemption).

Philosophy : 2 credits

Options : 3 credits

Minors or other available options (30 credits)

Evaluation

Admission to the programme

Conditions of admission

The conditions and regular admission requirements are specified on the web page "Access to Studies" :

<http://www.ucl.ac.be/etudes/libres/en/acces.html>

Special admission conditions

Programme re-orientation is possible from the bachelor programmes in Sciences or Applied Sciences

Admission requests, special rules and regulations

In the case of programme re-orientation, admission requests should be addressed to the Academic Secretary

Address : Place des sciences 2 - 1348 Louvain-la-Neuve

Positioning of the programme

Positioning of the programme within the University cursus

The bachelor's degree in Mathematical Sciences entitles automatic access to the master's of Mathematics orientated towards the domains of applications (Astronomy, Economics, Computing Science, Physics, Statistics etc.), towards research or teaching or mastery of Statistics.

Other studies accessible upon completion of the programme

The bachelor's degree likewise entitles access to certain orientations in Computing Science, Physics and Economics, provided the student has followed an appropriate minor and/or complementary study programme.

Useful contacts

Programme management

MATH Département de mathématique

Contact : Nathalie Micha

and the Department of Mathematics

Study Advisor

Camille Debiève

Exam Jury

1st year

President : Jean Mawhin

Secretary : Jan Govaerts

2nd year

Prresident : Still to be determined

Secretary : Still to be determined

3rd year

President : Still to be determined

Secretary : Still to be determined

List of accessible minors

- Minor in Theology
- Minor in Philosophy
- Minor in Law
- Minor in Criminology
- Minor in Information and Communication (*)
- Minor in Political Sciences

- Minor in Sociology and Anthropology
- Minor in Human and Social Sciences
- Minor in Economics
- Minor in Business Studies
- Minor in Linguistics
- Minor in Hispanic Studies (*)
- Minor in Italian Studies (*)
- Minor in French Studies (*)
- Minor in Latin Studies
- Minor in Greek Studies
- Minor in Oriental Studies
- Minor in Literature Studies
- Minor in History
- Minor in Medieval Studies
- Minor in History of Art and Archaeology (*)
- Minor in Musicology
- Minor in Psychology and Education (*)
- Minor in Human Nutrition
- Minor in General Biomedical Sciences
- Minor in Medication Sciences (*)
- Minor in Physical Activity, Health and Culture of Movement(*)
- Minor in Physics
- Minor in Geography
- Minor in Statistics
- Minor in Engineering Sciences : Applied Chemistry and Physics
- Minor in Engineering Sciences : Construction
- Minor in Engineering Sciences : Electricity
- Minor in Engineering Sciences : Applied Mathematics
- Minor in Engineering Sciences : Mechanics
- Minor in Urban Architecture
- Minor in Computing Science
- Minor in Biomedical Engineering
- Minor in Gender Studies
- Minor in Culture and Creation
- Minor in European Studies

(*) *Minor with access criteria*

Detailed content of standard programme

MAFY 11BA First year of studies

<u>MAT1131</u>	Linear Algebra[45h+45h] (8 credits) (in French)	Jean-Roger Roisin (coord.), Jean-Pierre Tignol
<u>MAT1121</u>	Mathematical analysis 1[30h+30h] (5 credits) (in French)	Thierry De Pauw, Patrick Habets, Jean Mawhin (coord.)
<u>PHY1111</u>	General Physics 1[45h+45h] (8 credits) (in French)	Denis Favart, Jan Govaerts
<u>MAFY1181</u>	Actualities in Mathematics and Physics[15h] (2 credits) (in French)	Francis Borceux, Bernard Piraux
<u>MAT1122</u>	Mathematical analysis 2[30h+30h] (5 credits) (in French)	Thierry De Pauw, Patrick Habets, Jean Mawhin (coord.)
<u>MAT1141</u>	Geometry I[45h+30h] (7 credits) (in French)	Francis Borceux
<u>MAT1151</u>	Numerical analysis : tools and software of calculus[30h+45h] (7 credits) (in French)	Pierre Bieliavsky
<u>MAT1161</u>	Mathematical methods in classical mathematics 1[22.5h+30h] (5 credits) (in French)	Jean Bricmont, Luc Haine
<u>PHY1112</u>	General Physics 2[45h+45h] (8 credits) (in French)	Denis Favart, Jan Govaerts
<u>ANG1861</u>	Reading and listening comprehension of scientific texts[6h] (2 credits) (in French)	Ahmed Adriouèche, Isabelle Druant, Annick Sonck

One course to be chosen from among the following :

<u>BIO1114</u>	Introduction to biology[30h+7.5h] (3 credits) (in French)	Michel Baguette, Claude Remacle, Philippe van den Bosch Sanchez de Aguilar (supplée Claude Remacle)
<u>CHM1112</u>	General Chemistry[22.5h+22.5h] (3 credits) (in French)	Jean-Paul Declercq
<u>ESPO1111A</u>	Political Economics (Part 1)[40h+10h] (4 credits) (in French)	N.
<u>BIR1130A</u>	Introductions aux sciences de la terre[30h] (3 credits) (in French)	Joseph Dufey, Philippe Sonnet

MATH 12BA Second year of studies

<u>MAT1231</u>	Multilinear algebra and group theory[30h+30h] (6 credits) (in French)	Jean-Roger Roisin, Jean-Pierre Tignol
<u>MAT1221</u>	Mathematical analysis 3[45h+45h] (9 credits) (in French)	Thierry De Pauw, Camille Debiève, Jean Mawhin
<u>MAT1261</u>	Mathematical methods of classic mechanics 2[22.5h+30h] (5 credits) (in French)	Jean Bricmont, Luc Haine
<u>MAT1271</u>	Calculation of probability and statistical analysis[30h+30h] (6 credits) (in French)	Rainer von Sachs
<u>SINF1150A</u>	Introduction à l'algorithmique et programmation A[30h+30h] (6 credits) Δ (in French)	Baudouin Le Charlier
<u>MAT1222</u>	Complex analysis[30h+15h] (5 credits) (in French)	Luc Haine
<u>MAT1223</u>	Differential equations[30h+15h] (5 credits) (in French)	Denis Bonheure
<u>MAT1241</u>	Geometry II[45h+15h] (6 credits) (in French)	Pierre Bieliavsky
<u>ANG1862</u>	Reading and listening comprehension of scientific texts[30h] (2 credits) (in French)	Ahmed Adriouche

Complementary studies in Mathematics or minor (10 credits)

The students will choose 10 credits, with the approval of the Study Advisor, either from one of the minors offered (minor in Economics, minor in Computing Sciences, minor in Applied Mathematics, minor in Physics, minor in Statistics), or from the list of options on offer, or from the ensemble of the University programmes.

MATH 13BA Third year of studies

<u>MAT1321</u>	Functional analysis and partial differential equations[45h+45h] (8 credits) Δ (in French)	N.
<u>MAT1322</u>	Measure theory[22.5h+15h] (3 credits) Δ (in French)	N.
<u>MAT1371</u>	Probability[30h+22.5h] (5 credits) Δ (in French)	N.
<u>SC1120</u>	Philosophy[30h] (2 credits) (in French)	Bernard Feltz
<u>ANG1863</u>	Anglais - expression orale[30h] (2 credits) Δ (in English)	Philippe Denis, Philippe Neyt (coord.), Colleen Starks, Françoise Stas
<u>MAT1331</u>	Commutative algebra[45h] (4 credits) Δ (in French)	N.
<u>MAT1351</u>	Numerical analysis : approximation, interpolation, integration (in French)	
<u>MAT1323</u>	Topology[22.5h+15h] (3 credits) Δ (in French)	N.
<u>MAT1381</u>	Personal project and seminary[30h] (8 credits) Δ (in French)	N.

Complementary studies in Mathematics or minor (20 credits)

The students will choose 20 credits, with the approval of the Study Advisor, either from one of the minors offered (minor in Economics, minor in Computing Sciences, minor in Applied Mathematics, minor in Physics, minor in Statistics), or from the list of options on offer, or from the ensemble of the University programmes.

Options

<u>MAT1235</u>	Some notions of mathematical logic[30h+15h] (5 credits) (in French)	Jean-Roger Roisin
<u>MAT1251</u>	Exercises on the use of mathematical software[15h] (2 credits) (in French)	Christian Fabry
<u>SC2002</u>	Elements of mathematics and physics history[30h] (4.5 credits) (in French)	Patricia De Grave
<u>PHY1222</u>	Quantum mechanics[45h+30h] (5 credits) (in French)	Jacques Weyers

<u>PHY1223</u>	Special Relativity[22.5h+15h] (4 credits) (in French)	Jean-Marc Gérard, Jan Govaerts
<u>PHY1261</u>	Astronomy and geophysics[15h+7.5h] (2 credits) (in French)	Véronique Dehant, Jean-Pascal van Ypersele de Strihou
<u>PHY1321</u>	Mathematical methods in Physics[30h+30h] (4 credits)  (in French)	N.
<u>STAT2415</u>	Introduction to Bayesian statistics.[15h] (2.5 credits) (in French)	Philippe Lambert
<u>INGE1221</u>	Econometrics[45h+15h] (5 credits) (in French)	Sébastien Van Bellegem
<u>STAT2416</u>	Multivariate probabilities and statistics[10h+5h] (2.5 credits) (in French)	Ingrid Van Keilegom
<u>STAT2430</u>	Statistical computing[20h+20h] (7 credits) (in French)	Bernadette Govaerts
<u>SINF1150B</u>	Introduction à l'algorithmique et programmation B[30h+30h] (6 credits)  (in French)	Baudouin Le Charlier
<u>INGI2101</u>	Discrete mathematics: logical foundations of computing science[30h+15h] (4 credits) (in French)	Philippe Delsarte, Axel Van Lamsweerde (coord.)
<u>INGI2123</u>	Calculability and complexity[30h+15h] (4 credits) (in French)	Yves Deville (coord.), Pierre Dupont, Baudouin Le Charlier
<u>ESAB1105</u>	Probability and statistics[30h+30h] (5 credits) (in French)	Isabelle De Macq (supplée Bernadette Govaerts), Bernadette Govaerts, Jean-Marie Rolin (supplée Rainer von Sachs), Rainer von Sachs
<u>INMA2380</u>	Matrix theory[30h+22.5h] (5 credits) (in French)	Paul Van Dooren
<u>INMA2702</u>	Applied mathematics : Optimization[30h+15h] (4 credits) (in French)	Vincent Blondel, François Glineur (supplée Vincent Blondel)
<u>INMA1691</u>	Discrete mathematics - Graph theory and algorithms[30h+22.5h] (5 credits) (in French)	Vincent Blondel, Laurence Wolsey, Laurence Wolsey (supplée Vincent Blondel)
<u>INMA1731</u>	Stochastic processes : Estimation and prediction[30h+30h] (5 credits)  (in French)	N.