



Appendices for the Master's degree programme(s) in Mathematics

2022-2023

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Appendix I Learning outcomes of the degree programme (art. 3.1)

Objectives of MSc Mathematics

As a consequence of the ongoing automation of society and the technological innovations that go along with it, the call of our society for mathematics is growing. Underneath virtually every form of automation lies a mathematical concept or model. In order to be able to respond to this development in society, it is important that mathematics is utilized in a proper and effective way. This requires that society has access to sufficiently many well qualified and highly trained mathematicians. The Master's degree programme in Mathematics aims to train mathematicians who meet this profile.

The Master's degree programme in Mathematics aims to impart knowledge, skills, understanding and an academic attitude in the field of mathematics by means of a broadly based curriculum building on a bachelor's degree in Mathematics, such that Master's graduates are able to pursue an independent career as independent professionals and are also qualified for further training to become academic researchers in the field.

Learning outcomes MSc Mathematics

The above objective has been translated into a set of learning outcomes for the programme. The learning outcomes consist of general learning outcomes with respect to both knowledge and skills, which are applicable for all tracks of the programme, supplemented with track-specific learning outcomes. For each learning outcome a reference to the Dublin descriptors is given between brackets.

The master graduate in Mathematics

- A1. has an understanding of the most important concepts of the field, [knowledge and understanding]
- A2. is able to contribute to the scientific advancement of a subfield of mathematics, [applying knowledge and understanding]
- A3. is able to use abstract thinking and mathematical reasoning to get to the root of a problem and thus recognize whether existing methods are applicable, or to ascertain that new methods must be developed, [applying knowledge and understanding]
- A4. is able to function in multidisciplinary teams, [applying knowledge and understanding]
- A5. is familiar with the social and ethical aspects of applying mathematics in practice, [judgement]
- A6. understands the scientific relevance of problem definitions and results, and the validity of the scientific method, [judgement]
- A7. is able to describe solutions in both general and formal mathematical terms, [communication]
- A8. is able to express him- or herself well both orally and in writing, [communication]
- A9. is able to evaluate the scientific literature so as to keep their knowledge up to date. [learning]

In addition, the master graduate in Mathematics, except for the track Science, Business and Policy,

- P1. has specialized knowledge of theories, methods and techniques in at least one of the following subfields of mathematics: [knowledge and understanding]
 - a. Algebra & Geometry



- b. Dynamical Systems and Analysis
- c. Probability and Statistics
- P2. has experience with formulating ideas and problems in the mathematical language and with interpreting the mathematical results in the light of the original, non-mathematical problem, [applying knowledge and understanding]
- P3. is able to apply scientific results and insights to concrete problems in mathematics or in related fields (natural sciences or applied mathematics), [applying knowledge and understanding]
- P4. is familiar with and experiences mathematics as a coherent organic unit. [judgement]

Whereas the master graduate in Mathematics track Science, Business and Policy

- M1. has an understanding of the way in which businesses and policy organizations are functioning (governments and non-governmental organizations, NGO's) [knowledge and understanding]
- M2. understands the connections between natural science research, business, and policy [knowledge and understanding]
- M3. Is able to integrate aspects of natural science, business and management [applying knowledge and understanding]
- M4. has developed his/her social and communicative skills, is able to work project-based, and is capable of taking professional responsibility [communication, judgement]



Appendix II Tracks/Specializations of the degree programme (art. 3.6)

The degree programme consisted out of three tracks:

1. Mathematics and Complex Dynamical Systems
2. Statistics and Big Data
3. Science, Business and Policy

The latter remains because it has different learning outcomes. The first two will be discontinued as soon as possible (taking into account the applicable period) and be replaced by the specializations:

- Number Theory and Algebraic Geometry
- Probability and Discrete Mathematics
- Analysis and Dynamical Systems
- Geometry and Topology
- Mathematical Physics

In the transition phase from tracks to specializations, both the tracks and the specializations are described. The set-up has been chosen such that the tracks 1 and 2 can be stopped without impacting the specializations.



Appendix III Content of the degree programme

(art. 3.8)

The degree programme is made up of the following course units

- Master Research Project in Mathematics
- Mathematics and its Environment
- Student Colloquium
- Research Seminar in Mathematics
- Topics in Dynamical Systems and Chaos A 22/23
- Topics in Dynamical Systems and Chaos B 23/24
- Hamiltonian Mechanics
- Topics in Algebra and Geometry A 22/23
- Topics in Algebra and Geometry B 23/24
- Topics in Differential Geometry
- Introduction to Algebraic Geometry
- Geometry and Topology 23/24
- Geometry and Differential Equations 22/23
- Topics in Number Theory 22/23
- Arithmetic Geometry 23/24
- Topics in Topology A 22/23
- Topics in Topology B 23/24
- Perturbation Theory 22/23
- Singularity Theory 23/24
- Integrable Systems
- Spectral Theory 23/24
- Random Geometry and Topology A 22/23
- Random Geometry and Topology B 23/24
- Combinatorial Mathematics A 22/23
- Combinatorial Mathematics B 23/24
- Topics in Probability and Statistics
- Mathematical Modelling and Statistical Analysis of the Spread of Infectious Diseases 23/24
- Contemporary Statistics with Applications
- Statistical Genomics (23/24)
- Statistical Consulting (22/23)

Tracks and specializations are based on this list, courses from other degree programmes and elective modules of the Dutch Mastermath programme consisting of about 60 Master's courses; see <http://elo.mastermath.nl> for details. Because the workload of modules from Mastermath is not 5 ECTS, but 6 or 8 ECTS, it may be that the total size of the programme is not exactly equal to 120 ECTS. If so, the size must be at least 120 ECTS and it should not be possible to remove 1 course and still have more than 120 ECTS; hence the total workload of the degree programme can be at most 124 ECTS. Note: At the discretion of the Board of Examiners, courses may be added as extracurricular.

For information on the modules offered by other degree programmes, see also the Teaching and Examination Regulations of the corresponding programme.

1. The programme for the track **Mathematics and Complex Dynamical Systems** is:



| Course unit | Course code | ECTS | Practical | Entry requirements |
|--|-------------|-------------|-----------|--|
| Mathematics and its Environment | WMMA013-05 | 5 | | |
| Student Colloquium | WMMA029-05 | 5 | | |
| Research Seminar in Mathematics | WMMA030-05 | 5 | | |
| ≥ 25 ECTS out of: | | ≥ 25 | | |
| - Topics in Dynamical Systems and Chaos A 22/23 | WMMA031-05 | 5 | | |
| - Topics in Dynamical Systems and Chaos B 23/24 | WMMA042-05 | 5 | | |
| - Hamiltonian Mechanics | WMMA019-05 | 5 | | |
| - Topics in Algebra and Geometry A 22/23 | WMMA038-05 | 5 | | |
| - Topics in Algebra and Geometry B 23/24 | WMMA048-05 | 5 | | |
| - Topics in Differential Geometry | WMMA040-05 | 5 | | |
| - Introduction to Algebraic Geometry | WMMA033-05 | 5 | | |
| - Geometry and Topology 23/24 | WMMA018-05 | 5 | | |
| - Geometry and Differential Equations 22/23 | WMMA017-05 | 5 | | |
| - Topics in Number Theory 22/23 | WMMA035-05 | 5 | | |
| - Arithmetic Geometry 23/24 | WMMA045-05 | 5 | | |
| - Topics in Topology A 22/23 | WMMA034-05 | 5 | | |
| - Topics in Topology B 23/24 | WMMA044-05 | 5 | | |
| - Perturbation Theory 22/23 | WMMA032-05 | 5 | | |
| - Singularity Theory 23/24 | WMMA043-05 | 5 | | |
| - Integrable Systems | WMMA037-05 | 5 | | |
| - Spectral Theory 23/24 | WMMA047-05 | 5 | | |
| - Random Geometry and Topology A 22/23 | WMMA041-05 | 5 | | |
| - Random Geometry and Topology B 23/24 | WMMA049-05 | 5 | | |
| - Combinatorial Mathematics A 22/23 | WMMA036-05 | 5 | | |
| - Combinatorial Mathematics B 23/24 | WMMA046-05 | 5 | | |
| - Topics in Probability and Statistics | WMMA039-05 | 5 | | |
| - Mathematical Modelling and Statistical Analysis of the Spread of Infectious Diseases 23/24 | WMMA061-05 | 5 | | |
| Electives (see App. IV) | | ≤ 30– 34 | | |
| Master Research Project in Mathematics | WMMA902-50 | 50 | | Successful completion of 40 ECTS of modules of Master's programme in Mathematics |

The total has to be at least 120 ECTS, but it should not be possible to remove 1 course and still have more than 120 ECTS.

2. The programme for the track **Statistics and Big Data** is:



| Course unit | Course code | ECTS | Practical | Entry requirements |
|--|---|---|-----------|--|
| Mathematics and its Environment | WMMA013-05 | 5 | | |
| Student Colloquium | WMMA029-05 | 5 | | |
| Research Seminar in Mathematics | WMMA030-05 | 5 | | |
| <p>≥ 23 ECTS out of:</p> <ul style="list-style-type: none"> - Contemporary Statistics with Applications - Statistical Genomics (23/24) - Statistical Consulting (22/23) - Introduction to Data Science - Topics in Probability and Statistics - Relevant courses from the Mastermath programme (at the discretion of the Board of Examiners) <p>Min. 3 courses have to be local non-Mastermath courses</p> | <p>WMMA015-05</p> <p>WMMA008-05</p> <p>WMMA024-05</p> <p>WMCS002-05</p> <p>WMMA039-05</p> | <p>≥ 23</p> <p>5</p> <p>5</p> <p>5</p> <p>5</p> <p>5</p> <p>6/8</p> | | |
| Electives (see App. IV) | | ≤ 32 – 34 | | |
| Master Research Project in Mathematics | WMMA902-50 | 50 | | Successful completion of 40 ECTS of modules of the Master's programme in Mathematics |

The total has to be at least 120 ECTS, but it should not be possible to remove 1 course and still have more than 120 ECTS.



3. The programme for the track **Science, Business and Policy** consists of a mathematical component (60 ECTS) and a Business and Policy component 60 ECTS:

| Mathematical component – Mathematics and Complex Dynamical Systems | | | | |
|---|--------------------|-------------|------------------|---------------------------|
| Course unit | Course code | ECTS | Practical | Entry requirements |
| Mathematics and its Environment | WMMA013-05 | 5 | | |
| ≥ 25 ECTS out of: | | ≥ 25 | | |
| - Topics in Dynamical Systems and Chaos A 22/23 | WMMA031-05 | 5 | | |
| - Topics in Dynamical Systems and Chaos B 23/24 | WMMA042-05 | 5 | | |
| - Hamiltonian Mechanics | WMMA019-05 | 5 | | |
| - Topics in Algebra and Geometry A 22/23 | WMMA038-05 | 5 | | |
| - Topics in Algebra and Geometry B 23/24 | WMMA048-05 | 5 | | |
| - Topics in Differential Geometry | WMMA040-05 | 5 | | |
| - Introduction to Algebraic Geometry | WMMA033-05 | 5 | | |
| - Geometry and Topology 23/24 | WMMA018-05 | 5 | | |
| - Geometry and Differential Equations 22/23 | WMMA017-05 | 5 | | |
| - Topics in Number Theory 22/23 | WMMA035-05 | 5 | | |
| - Arithmetic Geometry 23/24 | WMMA045-05 | 5 | | |
| - Topics in Topology A 22/23 | WMMA034-05 | 5 | | |
| - Topics in Topology B 23/24 | WMMA044-05 | 5 | | |
| - Perturbation Theory 22/23 | WMMA032-05 | 5 | | |
| - Singularity Theory 23/24 | WMMA043-05 | 5 | | |
| - Integrable Systems | WMMA037-05 | 5 | | |
| - Spectral Theory 23/24 | WMMA047-05 | 5 | | |
| - Random Geometry and Topology A 22/23 | WMMA041-05 | 5 | | |
| - Random Geometry and Topology B 23/24 | WMMA049-05 | 5 | | |
| - Combinatorial Mathematics A 22/23 | WMMA036-05 | 5 | | |
| - Combinatorial Mathematics B 23/24 | WMMA046-05 | 5 | | |
| - Topics in Probability and Statistics | WMMA039-05 | 5 | | |
| - Mathematical Modelling and Statistical Analysis of the Spread of Infectious Diseases 23/24 | WMMA061-05 | 5 | | |
| - Student Colloquium | WMMA029-05 | 5 | | |
| - Research Seminar in Mathematics | WMMA030-05 | 5 | | |
| - Relevant course from the Mastermath programme (at the discretion of the Board of Examiners). Min. 4 courses have to be local non-Mastermath courses | | 6/8 | | |
| Master Research Project in Mathematics (for SBP) | WMMA903-30 | 30 | | |

The total of the mathematical component has to be at least 60 ECTS, but it should not be possible to remove 1 course and still have more than 60 ECTS. At the discretion of the Board, extra courses may be added as extracurricular.



| Mathematical component – Statistics and Big Data | | | | |
|---|--------------------|-------------|-----------------------|-------------------------------|
| Course unit | Course code | ECTS | Prac tical | Entry requirements |
| Mathematics and its Environment | WMMA013-05 | 5 | | |
| ≥ 25 ECTS out of: | | ≥ 25 | | |
| - Contemporary Statistics with Applications | WMMA015-05 | 5 | | |
| - Statistical Genomics (23/24) | WMMA008-05 | 5 | | |
| - Statistical Consulting (22/23) | WMMA024-05 | 5 | | |
| - Introduction to Data Science | WMCS002-05 | 5 | | |
| - Topics in Probability and Statistics | WMMA039-05 | 5 | | |
| - Mathematical Modelling and Statistical Analysis of the Spread of Infectious Diseases 23/24 | WMMA061-05 | 5 | | |
| - Student Colloquium | WMMA029-05 | 5 | | |
| - Research Seminar in Mathematics | WMMA030-05 | 5 | | |
| - Max. one out of | | 5 | | |
| - Pattern Recognition | WMCS011-05 | | | |
| - Machine Learning | WMAI010-05 | | | |
| - Neural Networks and Computational Intelligence | WMCS010-05 | | | |
| - Statistical Signal Processing | WMAS011-05 | | | |
| - Relevant course from the Mastermath programme (at the discretion of the Board of Examiners) Min. 4 courses have to be local non-Mastermath courses | | 6/8 | | |
| Master Research Project in Mathematics (for SBP) | WMMA903-30 | 30 | | |

The total of the mathematical component has to be at least 60 ECTS, but it should not be possible to remove 1 course and still have more than 60 ECTS. At the discretion of the Board, extra courses may be added as extracurricular.



| Business and Policy component | | | | |
|---|--------------------|-------------|------------------|---|
| Course unit | Course code | ECTS | Practical | Entry Requirements |
| Introduction Science and Business | WMSE001-10 | 10 | | |
| Introduction Science and Policy | WMSE002-10 | 10 | | |
| Work Placement Business and Policy | WMSE901-40 | 40 | | Successful completion of Introduction Science and Business (WMSE001-10), Introduction Science and Policy (WMSE002-10), the 60 ECTS mathematical component of the programme (including Master Research Project in Mathematics (for SBP) (30 ECTS)), and the module Acquisition Tools & Career Management (0 ECTS). |
| Acquisition Tools and Career Management | | 0 | | |



The programme for the specialization **Number Theory and Algebraic Geometry** is:

| Course unit | Course code | ECTS | Practical | Entry requirements |
|--|-------------|-------------|-----------|--|
| Mathematics and its Environment | WMMA013-05 | 5 | | |
| Student Colloquium | WMMA029-05 | 5 | | |
| Research Seminar in Mathematics | WMMA030-05 | 5 | | |
| ≥ 25 ECTS out of: | | ≥ 25 | | |
| - Topics in Algebra and Geometry A 22/23 | WMMA038-05 | 5 | | |
| - Topics in Algebra and Geometry B 23/24 | WMMA048-05 | 5 | | |
| - Introduction to Algebraic Geometry | WMMA033-05 | 5 | | |
| - Geometry and Topology 23/24 | WMMA018-05 | 5 | | |
| - Topics in Number Theory 22/23 | WMMA035-05 | 5 | | |
| - Arithmetic Geometry 23/24 | WMMA045-05 | 5 | | |
| Electives (see App. IV) | | ≤ 30– 34 | | |
| Master Research Project in Mathematics | WMMA902-50 | 50 | | Successful completion of 40 ECTS of modules of the Master's programme in Mathematics |

The total has to be at least 120 ECTS, but it should not be possible to remove 1 course and still have more than 120 ECTS



The programme for the specialization **Probability and Discrete Mathematics** is:

| Course unit | Course code | ECTS | Practical | Entry requirements |
|--|-------------|--------------|-----------|--|
| Mathematics and its Environment | WMMA013-05 | 5 | | |
| Student Colloquium | WMMA029-05 | 5 | | |
| Research Seminar in Mathematics | WMMA030-05 | 5 | | |
| ≥ 25 ECTS out of: | | ≥ 25 | | |
| - Random Geometry and Topology A 22/23 | WMMA038-05 | 5 | | |
| - Random Geometry and Topology B 23/24 | WMMA048-05 | 5 | | |
| - Combinatorial Mathematics A 22/23 | WMMA036-05 | 5 | | |
| - Combinatorial Mathematics B 23/24 | WMMA046-05 | 5 | | |
| - Topics in Probability and Statistics | WMMA039-05 | 5 | | |
| - Mathematical Modelling and Statistical Analysis of the Spread of Infectious Diseases 23/24 | WMMA061-05 | 5 | | |
| Electives (see App. IV) | | ≤ 30 – 34 | | |
| Master Research Project in Mathematics | WMMA902-50 | 50 | | Successful completion of 40 ECTS of modules of the Master's programme in Mathematics |

The total has to be at least 120 ECTS, but it should not be possible to remove 1 course and still have more than 120 ECTS.



The programme for the specialization **Geometry and Topology** is:

| Course unit | Course code | ECTS | Practical | Entry requirements |
|---|-------------|-------------|-----------|--|
| Mathematics and its Environment | WMMA013-05 | 5 | | |
| Student Colloquium | WMMA029-05 | 5 | | |
| Research Seminar in Mathematics | WMMA030-05 | 5 | | |
| ≥ 25 ECTS out of: | | ≥ 25 | | |
| - Topics in Differential Geometry | WMMA040-05 | 5 | | |
| - Introduction to Algebraic Geometry | WMMA033-05 | 5 | | |
| - Geometry and Topology 23/24 | WMMA018-05 | 5 | | |
| - Geometry and Differential Equations 22/23 | WMMA017-05 | 5 | | |
| - Topics in Topology A 22/23 | WMMA034-05 | 5 | | |
| - Topics in Topology B 23/24 | WMMA044-05 | 5 | | |
| - Integrable Systems | WMMA037-05 | 5 | | |
| Electives (see App. IV) | | ≤ 30– 34 | | |
| Master Research Project in Mathematics | WMMA902-50 | 50 | | Successful completion of 40 ECTS of modules of the Master's programme in Mathematics |

The total has to be at least 120 ECTS, but it should not be possible to remove 1 course and still have more than 120 ECTS.



The programme for the specialization **Analysis and Dynamical Systems** is:

| Course unit | Course code | ECTS | Practical | Entry requirements |
|---|-------------|--------------|-----------|--|
| Mathematics and its Environment | WMMA013-05 | 5 | | |
| Student Colloquium | WMMA029-05 | 5 | | |
| Research Seminar in Mathematics | WMMA030-05 | 5 | | |
| ≥ 25 ECTS out of: | | ≥ 25 | | |
| - Topics in Dynamical Systems and Chaos A 22/23 | WMMA031-05 | 5 | | |
| - Topics in Dynamical Systems and Chaos B 23/24 | WMMA042-05 | 5 | | |
| - Geometry and Differential Equations 22/23 | WMMA017-05 | 5 | | |
| - Perturbation Theory 22/23 | WMMA032-05 | 5 | | |
| - Singularity Theory 23/24 | WMMA043-05 | 5 | | |
| - Integrable Systems | WMMA037-05 | 5 | | |
| - Spectral Theory 23/24 | WMMA047-05 | 5 | | |
| Electives (see App. IV) | | ≤ 30 – 34 | | |
| Master Research Project in Mathematics | WMMA902-50 | 50 | | Successful completion of 40 ECTS of modules of the Master's programme in Mathematics |

The total has to be at least 120 ECTS, but it should not be possible to remove 1 course and still have more than 120 ECTS.



The programme for the specialization **Mathematical Physics** is:

| Course unit | Course code | ECTS | Practical | Entry requirements |
|---|-------------|-------------|-----------|--|
| Mathematics and its Environment | WMMA013-05 | 5 | | |
| Student Colloquium | WMMA029-05 | 5 | | |
| Research Seminar in Mathematics | WMMA030-05 | 5 | | |
| ≥ 25 ECTS out of: | | ≥ 25 | | |
| - Hamiltonian Mechanics | WMMA019-05 | 5 | | |
| - Geometry and Differential Equations 22/23 | WMMA017-05 | 5 | | |
| - Geometry and Topology 23/24 | WMMA018-05 | 5 | | |
| - Perturbation Theory 22/23 | WMMA032-05 | 5 | | |
| - Singularity Theory 23/24 | WMMA043-05 | 5 | | |
| - Integrable Systems | WMMA037-05 | 5 | | |
| - Spectral Theory 23/24 | WMMA047-05 | 5 | | |
| Electives (see App. IV) | | ≤ 30– 34 | | |
| Master Research Project in Mathematics | WMMA902-50 | 50 | | Successful completion of 40 ECTS of modules of the Master's programme in Mathematics |

The total has to be at least 120 ECTS, but it should not be possible to remove 1 course and still have more than 120 ECTS.



Double Master's degree in Mathematics and Physics

A student who desires to obtain both a Masters's degree in Mathematics and a Master's degree in Physics has to be enrolled in both degree programmes and has to meet the requirements of both programmes. The following programme meets the requirements of the MSc Mathematics track Mathematics and Complex Dynamical Systems as well as the requirements of the MSc Physics, track Quantum Universe, where the individual Master Research Projects in Physics and Mathematics are replaced by a joint Master Research Project. The total programme comprises (at least) 180 ECTS: (at least) 100 ECTS of courses and 80 ECTS of research, and is feasible within 2 1/2 years of study.

Research Project (80 ECTS)

| Course unit name | Course code | ECTS | Practical | Entry requirements |
|---|-------------|------|-----------|--------------------------------------|
| Master Research Project Physics and Mathematics | WMPH903-80 | 80 | | Passed 50 ECTS of the modules below. |
| The Research Project includes: | | | | |
| - Scientific Integrity | WMPH019-00 | 0 | | |
| - Academic Skills | WMPH001-00 | 0 | | |
| - Career Perspectives | WMPH048-00 | 0 | | |
| - General Physics Colloquium | WMPH002-00 | 0 | | |

Physics (50 ECTS)

| Course unit name | Course code | ECTS | Practical | Entry requirements |
|--|-------------|------|-----------|--------------------|
| Advanced Quantum Mechanics | WMPH032-05 | 5 | | |
| Computational Physics | WMPH007-05 | 5 | | |
| Statistical Mechanics | WMPH029-05 | 5 | | |
| Mathematical Methods of Physics | WMPH016-05 | 5 | | |
| General Relativity | WMPH009-05 | 5 | | |
| Particle Physics Phenomenology | WMPH026-05 | 5 | | |
| Electrodynamics of Radiation Processes | WMAS008-05 | 5 | | |
| Student Seminar Quantum Universe | WMPH039-05 | 5 | | |
| Two optional courses Quantum Universe which are not part of the individual Mathematics programme of the student. Not allowed: - Geometry & Differential Equations - Geometry & Topology | | 10 | | |

For information about the courses of the Master's degree programme Physics and a list of optional courses Quantum Universe see the Teaching and Examination Regulations of the Master's degree programme in Physics.

Mathematics (50 ECTS)



| Course unit name | Course code | ECTS | Practical | Entry requirements |
|---|-------------|------|-----------|--------------------|
| Mathematics and its Environment | WMMA013-05 | 5 | | |
| Student Colloquium | WMMA029-05 | 5 | | |
| Research Seminar in Mathematics | WMMA030-05 | 5 | | |
| Geometry and Differential Equations 22/23 | WMMA017-05 | 5 | | |
| Geometry and Topology 23/24 | WMMA018-05 | 5 | | |
| ≥ 15 ECTS out of: | | ≥15 | | |
| - Topics in Dynamical Systems and Chaos A 22/23 | WMMA031-05 | 5 | | |
| - Topics in Dynamical Systems and Chaos B 23/24 | WMMA042-05 | 5 | | |
| - Hamiltonian Mechanics | WMMA019-05 | 5 | | |
| - Topics in Algebra and Geometry A 22/23 | WMMA038-05 | 5 | | |
| - Topics in Algebra and Geometry B 23/24 | WMMA048-05 | 5 | | |
| - Topics in Differential Geometry | WMMA040-05 | 5 | | |
| - Geometry and Differential Equations 22/23 | WMMA017-05 | 5 | | |
| - Topics in Number Theory 22/23 | WMMA035-05 | 5 | | |
| - Arithmetic Geometry 23/24 | WMMA045-05 | 5 | | |
| - Topics in Topology A 22/23 | WMMA034-05 | 5 | | |
| - Topics in Topology B 23/24 | WMMA044-05 | 5 | | |
| - Perturbation Theory 22/23 | WMMA032-05 | 5 | | |
| - Singularity Theory 23/24 | WMMA043-05 | 5 | | |
| - Integrable Systems | WMMA037-05 | 5 | | |
| - Spectral Theory 23/24 | WMMA047-05 | 5 | | |
| - Random Geometry and Topology A 22/23 | WMMA041-05 | 5 | | |
| - Random Geometry and Topology B 23/24 | WMMA049-05 | 5 | | |
| - Combinatorial Mathematics A 22/23 | WMMA036-05 | 5 | | |
| - Combinatorial Mathematics B 23/24 | WMMA046-05 | 5 | | |
| - Topics in Probability and Statistics | WMMA039-05 | 5 | | |
| - Mathematical Modelling and Statistical Analysis of the Spread of Infectious Diseases 23/24 | WMMA061-05 | 5 | | |
| Max. 2 relevant courses from the Mastermath programme (at the discretion of the Board of Examiners) | | ≤16 | | |

The total of the Mathematics part has to be at least 50 ECTS, but it should not be possible to remove 1 course and still have more than 50 ECTS.



This common programme can be split into the following distinct programmes

Physics, track Quantum Universe:

| Course unit | Course code | ECTS | Practical | Entry requirements |
|---|-------------|------|-----------|--------------------|
| Advanced Quantum Mechanics | WMPH032-05 | 5 | | |
| Computational Physics | WMPH007-05 | 5 | | |
| Statistical Mechanics | WMPH029-05 | 5 | | |
| Mathematical Methods of Physics | WMPH016-05 | 5 | | |
| General Relativity | WMPH009-05 | 5 | | |
| Particle Physics Phenomenology | WMPH026-05 | 5 | | |
| Electrodynamics of Radiation Processes | WMAS008-05 | 5 | | |
| Student Seminar Quantum Universe | WMPH039-05 | 5 | | |
| 20 ECTS optional modules: | | 20 | | |
| - Geometry and Topology 23/24 | WMMA018-05 | 5 | | |
| - Geometry and Differential Equations 22/23 | WMMA017-05 | 5 | | |
| Two optional courses Quantum Universe which are not part of the individual Mathematics programme of the student. Not allowed: | | 10 | | |
| - Geometry & Differential Equations | | | | |
| - Geometry & Topology | | | | |
| Master Research Project in Physics and Mathematics | WMMA903-80 | 80 | | |

Mathematics, track Mathematics and Complex Dynamical Systems:

| Course unit | Course code | ECTS | Practical | Entry requirements |
|---|-------------|------|-----------|--------------------|
| Mathematics and its Environment | WMMA013-05 | 5 | | |
| Student Colloquium | WMMA029-05 | 5 | | |
| Research Seminar in Mathematics | WMMA030-05 | 5 | | |
| Geometry and Differential Equations 22/23 | WMMA017-05 | 5 | | |
| Geometry and Topology 23/24 | WMMA018-05 | 5 | | |
| ≥ 15 ECTS out of: | | ≥ 15 | | |
| - Topics in Dynamical Systems and Chaos A 22/23 | WMMA031-05 | 5 | | |
| - Topics in Dynamical Systems and Chaos B 23/24 | WMMA042-05 | 5 | | |
| - Hamiltonian Mechanics | WMMA019-05 | 5 | | |
| - Topics in Algebra and Geometry A 22/23 | WMMA038-05 | 5 | | |
| - Topics in Algebra and Geometry B 23/24 | WMMA048-05 | 5 | | |
| - Topics in Differential Geometry | WMMA040-05 | 5 | | |



| | | | | |
|--|------------|-----|--|--|
| - Introduction to Algebraic Geometry | WMMA017-05 | 5 | | |
| - Topics in Number Theory 22/23 | WMMA035-05 | 5 | | |
| - Arithmetic Geometry 23/24 | WMMA045-05 | 5 | | |
| - Topics in Topology A 22/23 | WMMA034-05 | 5 | | |
| - Topics in Topology B 23/24 | WMMA044-05 | 5 | | |
| - Perturbation Theory 22/23 | WMMA032-05 | 5 | | |
| - Singularity Theory 23/24 | WMMA043-05 | 5 | | |
| - Integrable Systems | WMMA037-05 | 5 | | |
| - Spectral Theory 23/24 | WMMA047-05 | 5 | | |
| - Random Geometry and Topology A 22/23 | WMMA041-05 | 5 | | |
| - Random Geometry and Topology B 23/24 | WMMA049-05 | 5 | | |
| - Combinatorial Mathematics A 22/23 | WMMA036-05 | 5 | | |
| - Combinatorial Mathematics B 23/24 | WMMA046-05 | 5 | | |
| - Topics in Probability and Statistics | WMMA039-05 | 5 | | |
| - Mathematical Modelling and Statistical Analysis of the Spread of Infectious Diseases 23/24 | WMMA061-05 | 5 | | |
| Electives: | | | | |
| Guided choice: max. 2 relevant courses from the Mastermath programme; | | ≤16 | | |
| Free choice: max. 3 courses from the Physics part, e.g. | | ≤15 | | |
| – Advanced Quantum Mechanics | | | | |
| – Statistical Mechanics | | | | |
| – General Relativity | | | | |
| Master Research Project in Physics and Mathematics | WMMA903-80 | 80 | | |



Appendix IV Electives (art. 3.9.1)

This appendix sets out the optional course units of the Master's degree programme in Mathematics. The electives are divided into groups to facilitate a coherent choice. Note: based on a well-founded request by a student, the Board of Examiners may grant permission to choose electives other than those listed here (from the University of Groningen or another university in the Netherlands or abroad). The programme or a part of it must in any case be coherent and of master level (at the discretion of the Board of Examiners).

The electives are grouped in the following way:

Electives from Statistics

| Course unit | Course code | ECTS | Practical | Entry requirements |
|--|-------------|------|-----------|--------------------|
| Contemporary Statistics with Applications | WMMA015-05 | 5 | | |
| Statistical Genomics (23/24) | WMMA008-05 | 5 | | |
| Statistical Consulting (22/23) | WMMA024-05 | 5 | | |
| Introduction to Data Science | WMCS002-05 | 5 | | |
| Statistical Signal Processing | WMAS011-05 | 5 | | |
| Topics in Probability and Statistics | WMMA039-05 | 5 | | |
| Mathematical modelling and statistical analysis of the spread of infectious diseases (23/24) | WMMA061-05 | 5 | | |

Electives from Computational Mathematics

| Course unit | Course code | ECTS | Practical | Entry requirements |
|---|-------------|------|-----------|--------------------|
| Computational Fluid Dynamics | WMMA012-05 | 5 | PR | |
| Iterative Algorithms | WMMA057-05 | 5 | | |
| Finite Element Methods and Applications | WMMA051-05 | 5 | PR | |
| Coupled Problems (22/23) | WMMA052-05 | 5 | PR | |
| Multiscale Numerical Methods (23/24) | WMMA054-05 | 5 | PR | |
| Numerical Bifurcation Analysis (23/24) | WMMA055-05 | 5 | PR | |

Electives from Systems and Optimization

| Course unit | Course code | ECTS | Practical | Entry requirements |
|----------------|-------------|------|-----------|--------------------|
| Robust Control | WMMA021-05 | 5 | | |



| | | | | |
|---|------------|---|--|--|
| Convex Analysis (22/23) | WMMA060-05 | 5 | | |
| Iterative Algorithms | WMMA057-05 | 5 | | |
| Modeling and Identification (22/23) | WMMA007-05 | 5 | | |
| Modeling and Control of Complex Nonlinear Engineering Systems | WMMA020-05 | 5 | | |
| Calculus of Variations and Optimal Control (23/24)* | WMMA056-05 | 5 | | |
| Evolution Equations (23/24) | WMMA059-05 | 5 | | |
| Data-based Analysis and Control (23/24) | WMMA058-05 | 5 | | |

* A student may only take Calculus of Variations and Optimal Control if it was not part of his/her Bachelors' programme.

Electives from Number Theory and Algebraic Geometry

| Course unit name | Course code | ECTS | Practical | Entry requirements |
|--|-------------|------|-----------|--------------------|
| Topics in Algebra and Geometry A 22/23 | WMMA038-05 | 5 | | |
| Topics in Algebra and Geometry B 22/23 | WMMA048-05 | 5 | | |
| Introduction to Algebraic Geometry | WMMA033-05 | 5 | | |
| Geometry and Topology 23/24 | WMMA018-05 | 5 | | |
| Topics in Number Theory 22/23 | WMMA035-05 | 5 | | |
| Arithmetic Geometry 23/24 | WMMA045-05 | 5 | | |

Electives from Probability and Discrete Mathematics

| Course unit name | Course code | ECTS | Practical | Entry requirements |
|--|-------------|------|-----------|--------------------|
| Random Geometry and Topology A 22/23 | WMMA041-05 | 5 | | |
| Random Geometry and Topology B 23/24 | WMMA049-05 | 5 | | |
| Combinatorial Mathematics A 22/23 | WMMA036-05 | 5 | | |
| Combinatorial Mathematics B 23/24 | WMMA046-05 | 5 | | |
| Topics in Probability and Statistics | WMMA039-05 | 5 | | |
| Mathematical Modelling and Statistical Analysis of the Spread of Infectious Diseases 23/24 | WMMA061-05 | 5 | | |

Electives from Geometry and Topology

| Course unit name | Course code | ECTS | Practical | Entry requirements |
|------------------------------------|-------------|------|-----------|--------------------|
| Topics in Differential Geometry | WMMA040-05 | 5 | | |
| Introduction to Algebraic Geometry | WMMA033-05 | 5 | | |
| Geometry and Topology 23/24 | WMMA018-05 | 5 | | |



| | | | | |
|---|------------|---|--|--|
| Geometry and Differential Equations 22/23 | WMMA017-05 | 5 | | |
| Topics in Topology A 22/23 | WMMA034-05 | 5 | | |
| Topics in Topology B 23/24 | WMMA044-05 | 5 | | |
| Integrable Systems | WMMA037-05 | 5 | | |

Electives from Analysis and Dynamical Systems

| Course unit name | Course code | ECTS | Practical | Entry requirements |
|---|-------------|------|-----------|--------------------|
| Topics in Dynamical Systems and Chaos A 22/23 | WMMA031-05 | 5 | | |
| Topics in Dynamical Systems and Chaos B 23/24 | WMMA048-05 | 5 | | |
| Geometry and Differential Equations 22/23 | WMMA017-05 | 5 | | |
| Perturbation Theory 22/23 | WMMA032-05 | 5 | | |
| Singularity Theory 23/24 | WMMA043-05 | 5 | | |
| Integrable Systems | WMMA037-05 | 5 | | |
| Spectral Theory 23/24 | WMMA047-05 | 5 | | |

Electives from Mathematical Physics

| Course unit name | Course code | ECTS | Practical | Entry requirements |
|---|-------------|------|-----------|--------------------|
| Hamiltonian Mechanics | WMMA019-05 | 5 | | |
| Geometry and Differential Equations 22/23 | WMMA017-05 | 5 | | |
| Geometry and Topology 23/24 | WMMA018-05 | 5 | | |
| Perturbation Theory 22/23 | WMMA032-05 | 5 | | |
| Singularity Theory 23/24 | WMMA043-05 | 5 | | |
| Integrable Systems | WMMA037-05 | 5 | | |
| Spectral Theory 23/24 | WMMA047-05 | 5 | | |

External electives

The Departments of Mathematics of the Dutch universities organise a joint Mastermath programme consisting of about 60 Master's courses; see <http://elo.mastermath.nl> for details. The degree programme may contain elective modules of Mastermath. Because the workload of these modules is not 5 ECTS, but 6 or 8 ECTS, it may be that the total size of the programme is not exactly equal to 120 ECTS. If so, the size must be at least 120 ECTS and it should not be



possible to remove 1 course and still have more than 120 ECTS; hence the total workload of the degree programme can be at most 124 ECTS. Note, at the discretion of the Board of Examiners, courses may be added as extracurricular.

For information on the modules of degree programmes of the University of Groningen other than the ones offered by the Master's degree programme in Mathematics see the Teaching and Examination Regulations of the corresponding programme.

Mathematics and Complex Dynamical Systems

The electives in the track Mathematics and Complex Dynamical Systems have a workload of at most 30-34 ECTS, of which 0-15 ECTS can be chosen freely (course units of Master level, relevant to Mathematics, at the discretion of the Board of Examiners), the remaining electives must be chosen from the list below.

| Course unit | Course code | ECTS | Practical | Entry requirements |
|--|-------------|------|-----------|--------------------|
| Relevant courses from the Mastermath programme (at the discretion of the Board of Examiners) | | 6/8 | | |
| Electives from Statistics | | | | |
| Electives from Computational Mathematics | | | | |
| Electives from Systems and Optimization | | | | |
| Can only be followed together: | | | | |
| - Basiscursus Master Lerarenopleiding (Dutch) | TEM0105 | 5 | | |
| - Masterstage 1 (Dutch) | TEM0205 | 5 | | |

Note: The two last courses offer students the possibility to get acquainted with the work of a high school Mathematics teacher in the Netherlands. The courses are taught in Dutch and have to be followed simultaneously. Upon successful completion of both courses students have the possibility to follow the post-master degree programme 'Leraar Voorbereidend Hoger Onderwijs in de Betawetenschappen' (LVHO) where they only still have to follow 50 ECTS, instead of the normal 60 ECTS.

Statistics and Big Data

The electives in the track Statistics and Big Data have a workload of at most 30-34 ECTS, of which 0-15 ECTS can be chosen freely (course units of Master level, relevant to Mathematics, at the discretion of the Board of Examiners), the remaining electives must be chosen from the list below.

| Course unit | Course code | ECTS | Practical | Entry requirements |
|-------------------------------|-------------|------|-----------|--------------------|
| Pattern Recognition | WMCS011-05 | 5 | | |
| Machine Learning | WMAI010-05 | 5 | | |
| Statistical Signal Processing | WMAS011-05 | 5 | | |



| | | | | |
|--|------------|-----|--|--|
| Neural Networks and Computational Intelligence | WMCS010-05 | 5 | | |
| Web and Cloud Computing | WMCS005-05 | 5 | | |
| Scientific Visualization | WMCS018-05 | 5 | | |
| Scalable Computing | WMCS017-05 | 5 | | |
| Relevant courses from the Mastermath programme (at the discretion of the Board of Examiners) | | 6/8 | | |
| Electives from Computational Mathematics | | | | |
| Electives from Systems and Optimization | | | | |
| Electives from Number Theory and Algebraic Geometry | | | | |
| Electives from Probability and Discrete Mathematics | | | | |
| Electives from Geometry and Topology | | | | |
| Electives from Analysis and Dynamical Systems | | | | |
| Electives from Mathematical Physics | | | | |
| Can only be followed together: | | | | |
| - Basiscursus Master Lerarenopleiding (Dutch) | TEM0105 | 5 | | |
| - Masterstage 1 (Dutch) | TEM0205 | 5 | | |

Number Theory and Algebraic Geometry

The electives in the specialization Number Theory and Algebraic Geometry have a workload of at most 30-34 ECTS, of which 0-15 ECTS can be chosen freely (course units of Master level, relevant to Mathematics, at the discretion of the Board of Examiners), the remaining elective must be chosen from the list below.

| Course unit | Course code | ECTS | Practical | Entry requirements |
|--|-------------|------|-----------|--------------------|
| Relevant courses from the Mastermath programme (at the discretion of the Board of Examiners) | | 6/8 | | |
| Electives from Statistics | | | | |
| Electives from Computational Mathematics | | | | |



| | | | | |
|---|---------|---|--|--|
| Electives from Systems and Optimization | | | | |
| Electives from Probability and Discrete Mathematics | | | | |
| Electives from Geometry and Topology | | | | |
| Electives from Analysis and Dynamical Systems | | | | |
| Electives from Mathematical Physics | | | | |
| Can only be followed together: | | | | |
| - Basiscursus Master Lerarenopleiding (Dutch) | TEM0105 | 5 | | |
| - Masterstage 1 (Dutch) | TEM0205 | 5 | | |

Probability and Discrete Mathematics

The electives in the specialization Number Theory and Algebraic Geometry have a workload of at most 30-34 ECTS, of which 0-15 ECTS can be chosen freely (course units of Master level, relevant to Mathematics, at the discretion of the Board of Examiners), the remaining electives must be chosen from the list below.

| Course unit | Course code | ECTS | Practical | Entry requirements |
|--|-------------|------|-----------|--------------------|
| Relevant courses from the Mastermath programme (at the discretion of the Board of Examiners) | | 6/8 | | |
| Electives from Statistics | | | | |
| Electives from Computational Mathematics | | | | |
| Electives from Systems and Optimization | | | | |
| Electives from Number Theory and Algebraic Geometry | | | | |
| Electives from Geometry and Topology | | | | |
| Electives from Analysis and Dynamical Systems | | | | |
| Electives from Mathematical Physics | | | | |
| Can only be followed together: | | | | |
| - Basiscursus Master Lerarenopleiding (Dutch) | TEM0105 | 5 | | |
| - Masterstage 1 (Dutch) | TEM0205 | 5 | | |

Geometry and Topology

The electives in the specialization Geometry and Topology have a workload of at most 30-34 ECTS, of which 0-15 ECTS can be chosen freely (course units of Master level, relevant to Mathematics, at the discretion of the Board of Examiners), the remaining electives must be chosen from the list below.

| Course unit | Course code | ECTS | Practical | Entry requirements |
|-------------|-------------|------|-----------|--------------------|
|-------------|-------------|------|-----------|--------------------|



| | | | | |
|---|---------|-----|--|--|
| Relevant courses from the Mastermath programme (at the discretion of the Board of Examiners) | | 6/8 | | |
| Relevant courses from the MSc Physics/ Astrophysics: Quantum Universe (at the discretion of the Board of Examiners) | | | | |
| Electives from Statistics | | | | |
| Electives from Computational Mathematics | | | | |
| Electives from Systems and Optimization | | | | |
| Electives from Number Theory and Algebraic Geometry | | | | |
| Electives from Probability and Discrete Mathematics | | | | |
| Electives from Analysis and Dynamical Systems | | | | |
| Electives from Mathematical Physics | | | | |
| Can only be followed together: | | | | |
| - Basiscursus Master Lerarenopleiding (Dutch) | TEM0105 | 5 | | |
| - Masterstage 1 (Dutch) | TEM0205 | 5 | | |

Analysis and Dynamical Systems

The electives in the specialization Analysis and Dynamical Systems have a workload of at most 30-34 ECTS, of which 0-15 ECTS can be chosen freely (course units of Master level, relevant to Mathematics, at the discretion of the Board of Examiners), the remaining electives must be chosen from the list below.

| Course unit | Course code | ECTS | Practical | Entry requirements |
|---|-------------|------|-----------|--------------------|
| Relevant courses from the Mastermath programme (at the discretion of the Board of Examiners) | | 6/8 | | |
| Relevant courses from the MSc Physics/ Astrophysics: Quantum Universe (at the discretion of the Board of Examiners) | | | | |
| Electives from Statistics | | | | |
| Electives from Computational Mathematics | | | | |
| Electives from Systems and Optimization | | | | |
| Electives from Number Theory and Algebraic Geometry | | | | |
| Electives from Probability and Discrete Mathematics | | | | |
| Electives from Geometry and Topology | | | | |
| Electives from Mathematical Physics | | | | |



| | | | | |
|--|---------|---|--|--|
| Can only be followed together: | | | | |
| - Basiscursus Master Lerarenopleiding (Dutch) | TEM0105 | 5 | | |
| - Masterstage 1 (Dutch) | TEM0205 | 5 | | |

Mathematical Physics

The electives in the specialization Mathematical Physics have a workload of at most 30-34 ECTS, of which 0-15 ECTS can be chosen freely (course units of Master level, relevant to Mathematics, at the discretion of the Board of Examiners), the remaining electives must be chosen from the list below.

| Course unit | Course code | ECTS | Practical | Entry requirements |
|---|-------------|------|-----------|--------------------|
| Relevant courses from the Mastermath programme (at the discretion of the Board of Examiners) | | 6/8 | | |
| Relevant courses from the MSc Physics/ Astrophysics: Quantum Universe (at the discretion of the Board of Examiners) | | | | |
| Electives from Statistics | | | | |
| Electives from Computational Mathematics | | | | |
| Electives from Systems and Optimization | | | | |
| Electives from Number Theory and Algebraic Geometry | | | | |
| Electives from Probability and Discrete Mathematics | | | | |
| Electives from Geometry and Topology | | | | |
| Electives from Analysis and Dynamical Systems | | | | |
| Can only be followed together: | | | | |
| - Basiscursus Master Lerarenopleiding (Dutch) | TEM0105 | 5 | | |
| - Masterstage 1 (Dutch) | TEM0205 | 5 | | |



Appendix V Entry requirements and compulsory order of examinations

(art. 4.4)

| Course unit | ECTS | Entry requirements |
|------------------------------------|------|---|
| Master Research Project | 50 | Successful completion of 40 ECTS of modules of the Master's degree programme in Mathematics. |
| Work Placement Business and Policy | 40 | Successful completion of Introduction Science and Business (WMSE001-10), Introduction Science and Policy (WMSE002-10), the 60 ECTS mathematical component of the programme (including Master Research Project in Mathematics (for SBP) (30 ECTS)), and the module Acquisition Tools & Career Management (0 ECTS). |



Appendix VI Admission to the degree programme

(art. 2.1A.1 + 2.1B.1)

Holders of the following Bachelor's degrees from the University of Groningen are considered to have sufficient knowledge and skills and will be admitted to the Master's degree programme in Mathematics on that basis:

- BSc Mathematics
- BSc Applied Mathematics



Appendix VII Transitional provisions (art. 7.1)

Since the TER for this academic year is applicable to all students registered in the Master's degree programme in Applied Mathematics, regardless of the starting date of students, transitional arrangements are in place.

The 2022/23 curriculum has other compulsory course units than before. Therefore, a transitional arrangement applies to the cohort 2021/22 and earlier. Students from the cohort 2021/22 and earlier may replace the newly introduced courses Student Colloquium and Research Seminar in Applied Mathematics by the discontinued courses Mathematical Modelling Colloquium (WMMA023-05) and Complexity and Networks (WMMA005-05), respectively, provided the discontinued courses have been completed before September 1, 2022. Furthermore, for cohort 2021-2022 and earlier, the condition “ ≥ 25 ECTS out of” in the Track Mathematics and Complex Dynamical Systems is relaxed to “ ≥ 23 ECTS out of” and the list from which to choose is supplemented with relevant courses from the Mastermath programme (at the discretion of the Board of Examiners; at least 3 courses have to be local, non-Mastermath courses).

The transitional provisions below are an arrangement that students can use as a reference to courses that previously existed.

For cohort 2021-2022 and earlier

| Old Course | New Course |
|-----------------------------------|--|
| Mathematical Modelling Colloquium | Student Colloquium |
| Complexity and Networks | Research Seminar in Mathematics |
| Caput Statistics | Topics in Probability and Statistics |
| Caput Dynamical Systems and Chaos | Topics in Dynamical Systems and Chaos A or B |
| Caput Mathematical Physics | Integrable Systems |
| Caput Algebra and Geometry | Topics in Algebra and Geometry A or B |
| Caput Differential Geometry | Topics in Differential Geometry |
| Caput Number Theory | Topics in Number Theory |
| Topics Topology | Topics in Topology A or B |

See also the transitional arrangements in the appendices TER of previous years.

For information on transitional arrangements for courses offered by other degree programmes, see also the Teaching and Examination Regulations of the corresponding programme.



Appendix VIII Additional Requirements Open Degree Programmes (Art. 3.10)

In exceptional circumstances, students wishing to pursue an open degree programme may file a request with the Board of Examiners. An Open Degree Programme must always be approved in advance by the Board of Examiners. The Board of Examiners will evaluate whether the proposed curriculum meets the learning outcomes of the degree programme and can determine further conditions in their rules and regulations.

The Open Degree Programme in Mathematics must include the Master Research Project in Mathematics, the course units Mathematics and its Environment, Student Colloquium and Research Seminar in Mathematics and at least 5 courses are to be taken from

- Topics in Dynamical Systems and Chaos A 22/23
- Topics in Dynamical Systems and Chaos B 23/24
- Hamiltonian Mechanics
- Topics in Algebra and Geometry A 22/23
- Topics in Algebra and Geometry B 23/24
- Topics in Differential Geometry
- Introduction to Algebraic Geometry
- Geometry and Topology 23/24
- Geometry and Differential Equations 22/23
- Topics in Number Theory 22/23
- Arithmetic Geometry 23/24
- Topics in Topology A 22/23
- Topics in Topology B 23/24
- Perturbation Theory 22/23
- Singularity Theory 23/24
- Integrable Systems
- Spectral Theory 23/24
- Random Geometry and Topology A 22/23
- Random Geometry and Topology B 23/24
- Combinatorial Mathematics A 22/23
- Combinatorial Mathematics B 23/24
- Topics in Probability and Statistics
- Mathematical Modelling and Statistical Analysis of the Spread of Infectious Diseases 23/24
- Contemporary Statistics with Applications
- Statistical Genomics (23/24)
- Statistical Consulting (22/23)



Appendix IX

Application and decision deadlines for admission (art. 2.7.1 and 2.7.3)

Programmes starting on 1 September 2022

| Programme | Deadline of Application | Deadline of decision |
|---|-------------------------|----------------------|
| Behavioural and Cognitive Neurosciences | 1 May 2022 | 1 June 2022 |
| Biology | 1 May 2022 | 1 June 2022 |
| Biomedical Engineering | 1 May 2022 | 1 June 2022 |
| Biomedical Sciences | 1 May 2022 | 1 June 2022 |
| Biomolecular Sciences | 1 May 2022 | 1 June 2022 |
| Ecology and Evolution | 1 May 2022 | 1 June 2022 |
| Energy and Environmental Sciences | 1 May 2022 | 1 June 2022 |
| Human-Machine Communication | 1 May 2022 | 1 June 2022 |
| Marine Biology | 1 May 2022 | 1 June 2022 |
| Mechanical Engineering | 1 May 2022 | 1 June 2022 |
| Medical Pharmaceutical Sciences | 1 May 2022 | 1 June 2022 |
| Nanoscience: for non-EU/EEA students | 1 February 2022 | 1 June 2022 |
| Nanoscience: for EU/EEA students | 1 May 2022 | 1 June 2022 |
| Science Education and Communication | 1 May 2022 | 1 June 2022 |

Programmes starting on 1 September 2022 and 1 February 2023

| Programme | Deadline of Application for 1 September | Deadline of decision for 1 September | Deadline of Application for 1 February | Deadline of decision for 1 February |
|---------------------------------------|---|--------------------------------------|--|-------------------------------------|
| Applied Mathematics | 1 May 2022 | 1 June 2022 | 15 October 2022 | 15 November 2022 |
| Applied Physics | 1 May 2022 | 1 June 2022 | 15 October 2022 | 15 November 2022 |
| Artificial Intelligence | 1 May 2022 | 1 June 2022 | 15 October 2022 | 15 November 2022 |
| Astronomy | 1 May 2022 | 1 June 2022 | 15 October 2022 | 15 November 2022 |
| Chemical Engineering | 1 May 2022 | 1 June 2022 | 15 October 2022 | 15 November 2022 |
| Chemistry | 1 May 2022 | 1 June 2022 | 15 October 2022 | 15 November 2022 |
| Computing Science | 1 May 2022 | 1 June 2022 | 15 October 2022 | 15 November 2022 |
| Farmacie | 1 May 2022 | 1 June 2022 | 15 October 2022 | 15 November 2022 |
| Industrial Engineering and Management | 1 May 2022 | 1 June 2022 | 15 October 2022 | 15 November 2022 |
| Mathematics | 1 May 2022 | 1 June 2022 | 15 October 2022 | 15 November 2022 |
| Physics | 1 May 2022 | 1 June 2022 | 15 October 2022 | 15 November 2022 |