Programme-specific Section of the Curriculum for the MSc Programme in Mathematics with a minor subject at the Faculty of Science, University of Copenhagen 2009 (Rev. 2018)

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1 Title, affiliation and language
A shared section that applies to all BSc and MSc Programmes at the Faculty of Science is linked to this programme-specific curriculum.

1.1 Title
The MSc Programme in Mathematics with a minor subject leads to a Master of Science (MSc) in Mathematics and minor in [the minor subject] with the Danish title cand.scient. (candidatus/candidata scientiarum) i matematik med sidefag i [the minor subject].

It will appear from the diploma that the study programme has been completed as an MSc in two subjects and, provided that the requirements pertaining to the Upper Secondary School course packages (gymnasiefagpakkerne) have been met, that academic qualifications (faglig competence) for teaching at the Danish Upper Secondary School in the subjects have been achieved.

1.2 Affiliation
The programme is affiliated with the Study Board of Mathematics and Computer Science, and the students can both elect, and be elected, to this study board.

1.3 Corps of external examiners
The following corps of external examiners is used for the central parts of the MSc Programme:
• Corps of External Examiners for Mathematics (matematik).

1.4 Language
The language of this MSc Programme is English.

2 Academic profile
2.1 Purpose
The MSc programme in Mathematics with a minor subject is a research-based programme, the objective of which is to provide the student with the mathematical knowledge of and insights into the main fields and methodologies of mathematics and similar insights into the minor subjects so that the student can teach at the upper secondary level in both subjects.

2.2 General programme profile
The study programme allows in-depth study of various aspects of the mathematical core fields of algebra, analysis and geometry, but also more specialised mathematical disciplines, and metadisciplines such as the history and didactics of mathematics.

Mathematics is the key subject area of the programme.

2.3 General structure of the programme
The MSc Programme is set at 120 or 150 ECTS depending on whether the minor subject is within the field of sciences or not.

Exercise and Sport Sciences is in this regard considered as being outside the field of science.

The MSc Programme in Mathematics with a minor subject consists of the following elements:
• Basic study program, 120 ECTS-credits including the thesis.
• Extension of the minor subject, 30 ECTS, if the minor subject is outside the field of science.

There are no defined specialisations in this MSc Programme.
2.4 Career opportunities
The MSc Programme in Mathematics with a minor subject qualifies students to become professionals within business functions and/or areas such as:

- A PhD programme
- Upper Secondary School teacher in Mathematics and the minor subject.
- Teaching at university collages (Undervisning på professionshøjskoler).
- Double academic positions within relevant industries (Dobbelt-faglige funktioner i relevante industrigrene).

3 Description of competence profiles
Students following the MSc Programme acquire the knowledge, skills and competences listed below. Students will also acquire other qualifications through elective subject elements and other study activities.

3.1 Competence profile
On completion of the programme, an MSc in Mathematics with a minor subject has acquired the following:

Knowledge about:
- Selected research-active fields within mathematics.
- Selected fields within the minor subject.

Skills in/to:
- Read and understand mathematical original literature.
- Communicate mathematical issues on a scientific basis.
- Account orally and in writing for mathematical inquiries into open problems.

Competences in/to:
- Conducting independent, stringent argumentation.
- Structuring a study of open mathematical questions and dividing it into smaller easily accessible challenges.
- Delimiting mathematical disciplines in relation to each other, but also use techniques across disciplines.
- Independently taking responsibility for his or her own professional development and specialisation.
- Scientifically reflecting on methods for analysing and resolving mathematical questions.

4 Admission requirements
With a Bachelor’s degree in Mathematics from the University of Copenhagen the student is granted reserved access and guaranteed a place on the MSc Programme in Mathematics with a minor subject if the student applies before the application deadline during the first application period after the completion of the Bachelor’s degree.

The admission requirements for the MSc Programme in Mathematics with a minor subject is the same as the admission requirements listed in paragraph 4 in “Programme-specific Section of the Curriculum for the MSc Programme in Mathematics” supplemented with the following:

- At least 105 ECTS from the Upper Secondary School course package (gymnasiefagpakken) are included in the BSc programme.
• At least 45 ECTS from the minor subject is included in the BSc programme.
  o If the minor subject is within the field of sciences (with the exception of Exercise and Sport Sciences) the 45 ECTS must be contained in the minor subject Upper Secondary School course package (den reducerede gymnasiefagpakke).

5 Prioritisation of applicants
If the number of qualified applicants to the programme exceeds the number of places available the applicants will be prioritised according to paragraph 5 in “Programme-specific Section of the Curriculum for the MSc Programme in Mathematics”.

6 Structure of the programme
The compulsory subject elements, restricted elective subject elements and the thesis constitute the central parts of the programme (Section 21 of the Ministerial Order on Bachelor and Master’s Programmes (Candidatus) at Universities).

6.1 Programme components
The programme is set at 120/150 ECTS and consists of the following:

• Compulsory subject elements, 7.5 ECTS.
• Restricted elective subject elements within the major subject, 37.5 ECTS
• The minor subject
  o 45 ECTS (minor subject within the field of science).
  o 75 ECTS (minor subject outside the field of science).
• Thesis, 30 ECTS

6.1.1 Compulsory subject elements
All of the following subject elements are to be covered (22.5 ECTS):

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Block</th>
<th>ECTS</th>
</tr>
</thead>
<tbody>
<tr>
<td>NMAK15005U</td>
<td>Advanced Vector Spaces (AdVec)</td>
<td></td>
<td>7.5</td>
</tr>
</tbody>
</table>

6.1.2 Restricted elective subject elements within the major subject
37.5 ECTS are to be covered as subject elements from one or all of the following lists:

1) Up to 15 ECTS are to be covered from the following list, if they were not passed as part of the BSc programme:

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Block</th>
<th>ECTS</th>
</tr>
</thead>
<tbody>
<tr>
<td>NMAA05080U</td>
<td>Matematikkens historie (Hist1)</td>
<td>Block 3</td>
<td>7.5</td>
</tr>
<tr>
<td>NDIA10001U</td>
<td>Grundkursus i de naturvidenskabelige fags didaktik (DidG)</td>
<td>Block 4</td>
<td>7.5</td>
</tr>
</tbody>
</table>

2) Up to 15 ECTS are to be covered from the following list, if both of the BSc subject elements are passed:

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Block</th>
<th>ECTS</th>
</tr>
</thead>
<tbody>
<tr>
<td>NMAA06020U</td>
<td>Categories and Topology</td>
<td>Block 1</td>
<td>7.5</td>
</tr>
<tr>
<td>NMAK16022U</td>
<td>Partial Differential Equations</td>
<td>Block 1</td>
<td>7.5</td>
</tr>
<tr>
<td>NMAK16013U</td>
<td>Introduction to Modern Cryptography</td>
<td>Block 1</td>
<td>7.5</td>
</tr>
<tr>
<td>NMAK18001U</td>
<td>Analysis of Manifolds</td>
<td>Block 1</td>
<td>7.5</td>
</tr>
<tr>
<td>NMAK13030U</td>
<td>Approximation Properties for Operator Algebras and Groups</td>
<td>Block 1</td>
<td>7.5</td>
</tr>
<tr>
<td>NMAK16000U</td>
<td>Algebraic Geometry 2</td>
<td>Block 1</td>
<td>7.5</td>
</tr>
<tr>
<td>NMAK16001U</td>
<td>Analytic Number Theory</td>
<td>Block 2</td>
<td>7.5</td>
</tr>
<tr>
<td>NMAK16008U</td>
<td>Experimental Mathematics</td>
<td>Block 2</td>
<td>7.5</td>
</tr>
<tr>
<td>NMAK17004U</td>
<td>Introduction to Descriptive Set</td>
<td>Block 2</td>
<td>7.5</td>
</tr>
</tbody>
</table>
### 3) 22.5 ECTS are to be covered by the following subject elements:

<table>
<thead>
<tr>
<th>Subject Code</th>
<th>Subject Name</th>
<th>Block</th>
<th>ECTS</th>
</tr>
</thead>
<tbody>
<tr>
<td>NMAK18009U</td>
<td>Topics in Mathematical Logic</td>
<td></td>
<td>7.5</td>
</tr>
<tr>
<td>NMAK14020U</td>
<td>Quantum Information Theory</td>
<td>QIT</td>
<td>7.5</td>
</tr>
<tr>
<td>NMAK16007U</td>
<td>Elliptic Curves</td>
<td></td>
<td>7.5</td>
</tr>
<tr>
<td>NMAK18005U</td>
<td>Introduction to Representation Theory</td>
<td></td>
<td>7.5</td>
</tr>
<tr>
<td>NMAAA07012U</td>
<td>Introduction to Operator Algebras</td>
<td>IntroOpAlg</td>
<td>7.5</td>
</tr>
<tr>
<td>NMAK14009U</td>
<td>Commutative Algebra</td>
<td>KomAlg</td>
<td>7.5</td>
</tr>
<tr>
<td>NMAAA13029U</td>
<td>Algebraic Topology 1.5: Cohomology</td>
<td>AlgTop1.5</td>
<td>7.5</td>
</tr>
<tr>
<td>NMAK17002U</td>
<td>Complex Analysis 2</td>
<td></td>
<td>7.5</td>
</tr>
<tr>
<td>NMAK17011U</td>
<td>Algebraic Number Theory</td>
<td>AlgNT</td>
<td>7.5</td>
</tr>
<tr>
<td>NMAAA13036U</td>
<td>Introduction to Mathematical Logic</td>
<td></td>
<td>7.5</td>
</tr>
<tr>
<td>NMAK14005U</td>
<td>Algebraic Geometry</td>
<td>AlgGeo</td>
<td>7.5</td>
</tr>
<tr>
<td>NMAA09039U</td>
<td>Algebraic Topology II</td>
<td>AlgTop2</td>
<td>7.5</td>
</tr>
<tr>
<td>NMAAA13034U</td>
<td>Introduction to K-theory</td>
<td>K-Theory</td>
<td>7.5</td>
</tr>
<tr>
<td>NMAK15003U</td>
<td>Advanced Mathematical Physics</td>
<td>AdvMathPhys</td>
<td>7.5</td>
</tr>
<tr>
<td>NMAK13013U</td>
<td>Lie Groups*</td>
<td>GeomLie</td>
<td>7.5</td>
</tr>
</tbody>
</table>

* The courses are not offered in 2018/19.

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### 6.1.3 Restricted elective subject elements within the minor subject

45 ECTS are to be covered as subject elements from the minor subject if the minor subject is within the field of science.

75 ECTS are to be covered as subject elements from the minor subject if the minor subject is outside the field of science.

If the student lacks less than 45 or 75 ECTS of the minor subject when the MSc Programme begins, the difference must be covered as elective subjects.

### 6.1.4 Elective subject elements

The elective subjects are generally covered by the subject elements which the student follows on the minor subject.

It is, however, possible to release elective subject elements if the academic minimum requirements for the minor subjects have been met – this will, e.g., be the case if one or both of the following two conditions are present:

- A subject element form part of both the major and minor Upper Secondary School course packages (*gymnasiefagpakker*). The subject element should only be passed once, and the student has full freedom of choice in terms of the remaining ECTS.
• If less than 45 or 75 ECTS within the minor subject are missing when entering the MSc Programme.

BSc subject elements corresponding to 15 ECTS may be included in the MSc Programme as elective subject elements.

Projects outside the course scope may be included in the elective section of the programme with up to 15 ECTS. The regulations are described in Appendix 5 to the shared section of the curriculum.

Projects in practice may be included in the elective section of the programme with 15 ECTS. The regulations are described in Appendix 4 to the shared section of the curriculum.

6.1.5 Thesis
The MSc Programme in Mathematics with a minor subject includes a thesis corresponding to 30 ECTS, as described in Appendix 2 to the shared curriculum. The thesis must be written within the academic scope of the programme.

6.1.6 Academic mobility
The academic mobility is generally covered by the subject elements, which the student follows on the minor subject.

The student has the possibility to arrange academic mobility in other parts of the programme. This requires that the student acts according to the rules and regulations regarding pre-approvals and credit.

7 Exemptions
In exceptional circumstances, the study board may grant exemptions from the rules in the curriculum specified solely by the Faculty of Science.

8 Commencement etc.
8.1 Validity
This subject specific section of the curriculum applies to all students enrolled in the programme – see however Appendix 2.

8.2 Transfer
Students enrolled on previous curricula may be transferred to the new one as per the applicable transfer regulations or according to an individual credit transfer by the study board.

8.3 Amendments
The curriculum may be amended once a year so that any changes come into effect at the beginning of the academic year. Amendments must be proposed by the study board and approved by the Dean.

Notification about amendments that tighten the admission requirements for the programme will be published online at www.science.ku.dk one year before they come into effect.

If amendments are made to this curriculum, an interim arrangement may be added if necessary to allow students to complete their MSc Programme according to the amended curriculum.
Appendix 1 Tables

Table for students admitted to the programme in September (summer):

Table – MSc Programme in Mathematics with a minor subject within SCIENCE (thesis, full time)

<table>
<thead>
<tr>
<th>Block 1</th>
<th>Block 2</th>
<th>Block 3</th>
<th>Block 4</th>
</tr>
</thead>
<tbody>
<tr>
<td>1st year</td>
<td>Minor subject</td>
<td>Minor subject</td>
<td>Restricted elective</td>
</tr>
<tr>
<td></td>
<td>Minor subject</td>
<td>Minor subject</td>
<td>Minor subject</td>
</tr>
<tr>
<td>2nd year</td>
<td>Advanced Vector Spaces</td>
<td>Restricted elective</td>
<td>Thesis</td>
</tr>
<tr>
<td></td>
<td>Restricted elective</td>
<td>Restricted elective</td>
<td></td>
</tr>
</tbody>
</table>

The table illustrates the recommended academic progression. The student is allowed to plan an alternative progression within the applicable rules.

Table – MSc Programme in Mathematics with a minor subject within SCIENCE (thesis, part time)

<table>
<thead>
<tr>
<th>Block 1</th>
<th>Block 2</th>
<th>Block 3</th>
<th>Block 4</th>
</tr>
</thead>
<tbody>
<tr>
<td>1st year</td>
<td>Advanced Vector Spaces</td>
<td>Restricted elective</td>
<td>Minor subject</td>
</tr>
<tr>
<td></td>
<td>Minor subject</td>
<td>Minor subject</td>
<td>Minor subject</td>
</tr>
<tr>
<td>2nd year</td>
<td>Thesis</td>
<td>Restricted elective</td>
<td>Restricted elective</td>
</tr>
<tr>
<td></td>
<td>Restricted elective</td>
<td>Restricted elective</td>
<td>Restricted elective</td>
</tr>
</tbody>
</table>

The table illustrates the recommended academic progression. The student is allowed to plan an alternative progression within the applicable rules.

Table – MSc Programme in Mathematics with a minor subject outside SCIENCE (thesis, full time)

<table>
<thead>
<tr>
<th>Block 1</th>
<th>Block 2</th>
<th>Block 3</th>
<th>Block 4</th>
</tr>
</thead>
<tbody>
<tr>
<td>1st year</td>
<td>Minor subject</td>
<td>Minor subject</td>
<td>Minor subject</td>
</tr>
<tr>
<td></td>
<td>Minor subject</td>
<td>Minor subject</td>
<td>Restricted elective</td>
</tr>
<tr>
<td>2nd year</td>
<td>Advanced Vector Spaces</td>
<td>Restricted elective</td>
<td>Restricted elective</td>
</tr>
<tr>
<td></td>
<td>Minor subject</td>
<td>Minor Subject</td>
<td>Minor subject</td>
</tr>
<tr>
<td>3rd year</td>
<td>Thesis</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

The table illustrates the recommended academic progression. The student is allowed to plan an alternative progression within the applicable rules. Note that minor subjects outside SCIENCE may have a fixed progression.
Table – MSc Programme in Mathematics with a minor subject outside SCIENCE (thesis, part time)

<table>
<thead>
<tr>
<th></th>
<th>Block 1</th>
<th>Block 2</th>
<th>Block 3</th>
<th>Block 4</th>
</tr>
</thead>
<tbody>
<tr>
<td>1st year</td>
<td>Minor subject</td>
<td>Minor subject</td>
<td>Restricted elective</td>
<td>Restricted elective</td>
</tr>
<tr>
<td></td>
<td>Minor subject</td>
<td>Minor subject</td>
<td>Minor subject</td>
<td>Minor Subject</td>
</tr>
<tr>
<td>2nd year</td>
<td>Advanced Vector Spaces</td>
<td>Restricted elective</td>
<td>Minor subject</td>
<td>Minor Subject</td>
</tr>
<tr>
<td></td>
<td>Restricted elective</td>
<td>Restricted elective</td>
<td>Thesis</td>
<td></td>
</tr>
<tr>
<td>3rd year</td>
<td>Minor subject</td>
<td>Minor subject</td>
<td>Thesis</td>
<td></td>
</tr>
</tbody>
</table>

Compulsory [ ] Restricted elective [ ] Elective

The table illustrates the recommended academic progression. The student is allowed to plan an alternative progression within the applicable rules. Note that minor subjects outside SCIENCE may have a fixed progression.

Table for students admitted to the programme in February (winter):

Table – MSc Programme in Mathematics with a minor subject within SCIENCE (thesis, full time)*

<table>
<thead>
<tr>
<th></th>
<th>Block 3</th>
<th>Block 4</th>
<th>Block 1</th>
<th>Block 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>1st year</td>
<td>Minor subject</td>
<td>Minor subject</td>
<td>Advanced Vector Spaces</td>
<td>Restricted elective</td>
</tr>
<tr>
<td></td>
<td>Minor subject</td>
<td>Minor subject</td>
<td>Restricted elective</td>
<td>Restricted elective</td>
</tr>
<tr>
<td>2nd year</td>
<td>Restricted elective</td>
<td>Restricted elective</td>
<td>Thesis</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Minor subject</td>
<td>Minor subject</td>
<td>Thesis</td>
<td></td>
</tr>
</tbody>
</table>

Compulsory [ ] Restricted elective [ ] Elective

The table illustrates the recommended academic progression. The student is allowed to plan an alternative progression within the applicable rules. *This table is only relevant for students who begin the MSc Programme in February (block 3)

Table – MSc Programme in Mathematics with a minor subject within SCIENCE (thesis, part time)*

<table>
<thead>
<tr>
<th></th>
<th>Block 3</th>
<th>Block 4</th>
<th>Block 1</th>
<th>Block 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>1st year</td>
<td>Minor subject</td>
<td>Minor subject</td>
<td>Restricted elective</td>
<td>Restricted elective</td>
</tr>
<tr>
<td></td>
<td>Minor subject</td>
<td>Minor subject</td>
<td>Advanced Vector Spaces</td>
<td>Restricted elective</td>
</tr>
<tr>
<td>2nd year</td>
<td>Minor subject</td>
<td>Minor subject</td>
<td>Restricted elective</td>
<td>Restricted elective</td>
</tr>
<tr>
<td></td>
<td>Minor subject</td>
<td>Minor subject</td>
<td>Thesis</td>
<td></td>
</tr>
</tbody>
</table>

Compulsory [ ] Restricted elective [ ] Elective

The table illustrates the recommended academic progression. The student is allowed to plan an alternative progression within the applicable rules. *This table is only relevant for students who begin the MSc Programme in February (block 3)
### Table – MSc Programme in Mathematics with a minor subject outside SCIENCE (thesis, full time)*

<table>
<thead>
<tr>
<th></th>
<th>Block 3</th>
<th>Block 4</th>
<th>Block 1</th>
<th>Block 2</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>1st year</strong></td>
<td>Minor subject</td>
<td>Minor subject</td>
<td>Minor subject</td>
<td>Minor subject</td>
</tr>
<tr>
<td></td>
<td>Minor subject</td>
<td>Minor subject</td>
<td>Minor subject</td>
<td>Minor subject</td>
</tr>
<tr>
<td><strong>2nd year</strong></td>
<td>Minor subject</td>
<td>Minor subject</td>
<td>Advanced Vector Spaces</td>
<td>Restricted elective</td>
</tr>
<tr>
<td></td>
<td>Restricted elective</td>
<td>Restricted elective</td>
<td>Restricted elective</td>
<td>Restricted elective</td>
</tr>
<tr>
<td><strong>3rd year</strong></td>
<td>Thesis</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*This table is only relevant for students who begin the MSc Programme in February (block 3).

### Table – MSc Programme in Mathematics with a minor subject outside SCIENCE (thesis, part time)*

<table>
<thead>
<tr>
<th></th>
<th>Block 3</th>
<th>Block 4</th>
<th>Block 1</th>
<th>Block 2</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>1st year</strong></td>
<td>Minor subject</td>
<td>Minor subject</td>
<td>Minor subject</td>
<td>Minor subject</td>
</tr>
<tr>
<td></td>
<td>Minor subject</td>
<td>Minor subject</td>
<td>Minor subject</td>
<td>Minor subject</td>
</tr>
<tr>
<td><strong>2nd year</strong></td>
<td>Minor subject</td>
<td>Minor subject</td>
<td>Advanced Vector Spaces</td>
<td>Restricted elective</td>
</tr>
<tr>
<td></td>
<td>Restricted elective</td>
<td>Restricted elective</td>
<td>Restricted elective</td>
<td>Thesis</td>
</tr>
<tr>
<td><strong>3rd year</strong></td>
<td>Restricted elective</td>
<td>Restricted elective</td>
<td>Thesis</td>
<td></td>
</tr>
</tbody>
</table>

*This table is only relevant for students who begin the MSc Programme in February (block 3).
Appendix 2 Interim arrangements

The Shared Section of the BSc and MSc Curricula for Study Programmes applies to all students.

The interim arrangements below only consist of parts where the current curriculum differs from the rules and regulations that were previously valid. Therefore, if information about relevant rules and regulations are missing, it can be found in the curriculum above.

1 General changes for students admitted in the academic year 2017/18

Students admitted to the MSc Programme in the academic year 2017/18 must finish the programme as listed in the curriculum above with the following exceptions.

Restricted elective subject elements

2) Up to 15 ECTS are to be covered from the following list, if both of the BSc subject elements are passed:

- Restricted elective subject elements offered in the list 2) in this curriculum (see above)
- NMAK17009U Topics in Algebra and Number Theory | Block 4 | 7.5 ECTS
- NMAK15023U Topics in Algebraic Typology | TopTopics | Block 2 | 7.5 ECTS

2 General changes for students admitted in the academic year 2016/17

Students admitted to the MSc Programme in the academic year 2016/17 must finish the programme as listed in the curriculum above with the following exceptions.

Restricted elective subject elements

2) Up to 15 ECTS are to be covered from the following list, if both of the BSc subject elements are passed:

- Restricted elective subject elements offered in the list 2) in this curriculum (see above)
- NMAK15023U Topics in Algebraic Typology | Block 2 | 7.5 ECTS
- NMAK17009U Topics in Algebra and Number Theory | Block 4 | 7.5 ECTS
- NMAK15012U Euclidean Rings | Discontinued* | 7.5 ECTS
- NMAK16011U Groups and C*-Algebras | Discontinued* | 7.5 ECTS
- NMAK16012U Gödels Constructive Universe of Sets | Discontinued* | 7.5 ECTS
- NMAK16003U Computational Algebraic Geometry | Discontinued* | 7.5 ECTS

* See course specific changes below.

3 General changes for students admitted in the academic year 2015/16 or earlier

Students admitted to the MSc Programme in the academic year 2015/16 or earlier must finish the programme as listed in the curriculum above with the following exceptions.

Restricted elective subject elements

2) Up to 15 ECTS are to be covered from the following list, if both of the BSc subject elements are passed:

- Restricted elective subject elements offered in the list 2) in this curriculum (see above)
- NMAK15023U Topics in Algebraic Typology | Block 2 | 7.5 ECTS
- NMAK17009U Topics in Algebra and Number Theory | Block 4 | 7.5 ECTS
- NMAK15015U Graph Coloring | Discontinued* | 7.5 ECTS
- NMAK14011U Descriptive Set Theory (DesSet) | Discontinued* | 7.5 ECTS
- NMAK14027U Transcendental Numbers | Discontinued* | 7.5 ECTS
- NMAK14034U Heights and Diophantine Problems | Discontinued* | 7.5 ECTS
- NMAK15012U Euclidean Rings | Discontinued* | 7.5 ECTS
4 General changes for students admitted in the academic year 2014/15 or earlier

Students admitted to the MSc Programme in the academic year 2014/15 or earlier must finish the programme as listed in the curriculum above with the following exceptions.

Structure of the programme
For students admitted to the MSc Programme in the academic year 2014/15 or earlier the programme consists of the following:

- Restricted elective subject elements within the major subject, 45 ECTS
- Restricted elective subject elements within the minor subject
  - 45 ECTS (if the minor subject is within the field of science)
  - 75 ECTS (if the minor subject is outside the field of science)
- Thesis, 30 ECTS.

Restricted elective subject elements
45 ECTS are to be covered as subject elements from the following lists:

1) At least 30 ECTS are to be covered as subject elements from the following list:

- NMAA05014U Algebra 3 (Alg3) Block 1 7.5 ECTS
- NMAA05038U Algebraic Topology (AlgTop) Block 1 7.5 ECTS
- NFKA09006U Advanced Didactics of Mathematics (DidMatV) Block 1 7.5 ECTS
- NMAK11003U Advanced Probability Theory 1 (VidSand1) Block 1 7.5 ECTS
- NMAK15016U History of Mathematics 2 (Hist2) Block 2 7.5 ECTS
- NMAK10008U Functional Analysis (FunkAn) Block 2 7.5 ECTS
- NMAA05100U Homological Algebra (HomAlg) Block 2 7.5 ECTS
- NMAK11011U Advanced Probability Theory 2 (VidSand2) Block 2 7.5 ECTS
- NMAA06062U Geometry 2 (Geom2) Block 2 7.5 ECTS
- NMAK10019U Differential Operators and Function Spaces (DifFun) Block 3 7.5 ECTS

2) Up to 15 ECTS in BSc subject elements from the following list, if they were not passed as part of the BSc programme:

- NMAA05080U Matematikkens historie 1 (Hist1) Block 3 7.5 ECTS
- NDIA10001U Grundkursus i de naturvidenskabelige fags didaktik (DidG) Block 4 7.5 ECTS

3) The remaining credits(up to 15 ECTS) are to be covered by subject elements from the following list:

- Subject elements held by the Department of Mathematical Sciences on MSc level Up to 15 ECTS
- Projects outside the course scope on MSc level Up to 15 ECTS

* See course specific changes below.
5 Course specific changes

<table>
<thead>
<tr>
<th>Discontinued course</th>
<th>Interim arrangement</th>
</tr>
</thead>
<tbody>
<tr>
<td>Computational Algebraic Geometry (NMAK16003U), 7.5 ECTS</td>
<td>The course was a restricted elective course in the academic year 2015/16 and 2016/17. The course was offered for the last time in the academic year 2016/17 and a third exam is offered in the academic year 2017/18.</td>
</tr>
<tr>
<td>Graph Coloring (NMAK15015U), 7.5 ECTS</td>
<td>The course was a restricted elective course in the academic year 2015/16 or earlier. The course was offered for the last time in the academic year 2015/16 and a third exam is offered in the academic year 2016/17.</td>
</tr>
<tr>
<td>Descriptive Set Theory (DesSet) (NMAK14011U), 7.5 ECTS</td>
<td>The course was a restricted elective course in the academic year 2015/16 or earlier. The course was offered for the last time in the academic year 2015/16 and a third exam is offered in the academic year 2016/17.</td>
</tr>
<tr>
<td>Euclidean Rings (NMAK15012U), 7.5 ECTS</td>
<td>The course was a restricted elective course in the academic year 2015/16 and 2016/17. The course was offered for the last time in the academic year 2015/16 and a third exam is offered in the academic year 2016/17.</td>
</tr>
<tr>
<td>Groups and C*-Algebras (NMAK16011U), 7.5 ECTS</td>
<td>The course was a restricted elective course in the academic year 2015/16 or earlier. The course was offered for the last time in the academic year 2015/16 and a third exam is offered in the academic year 2017/18.</td>
</tr>
<tr>
<td>Gödels Constructive Universe of Sets (NMAK16012U), 7.5 ECTS</td>
<td>The course was a restricted elective course on “General Profile in Mathematics” and “Nordic Double Degree in Didactics of Mathematics (1st year in CPH)” in the academic year 2016/17 and 2015/16. The course was offered for the last time in the academic year 2016/17 and a third exam is offered in the academic year 2017/18.</td>
</tr>
<tr>
<td>Transcendental Numbers (NMAK14027U), 7.5 ECTS</td>
<td>The course was a restricted elective course in the academic year 2015/16 or earlier. The course was offered for the last time in the academic year 2015/16 and a third exam is offered in the academic year 2016/17.</td>
</tr>
<tr>
<td>Heights and Diophantine Problems (NMAK14034U), 7.5 ECTS</td>
<td>The course was a restricted elective course in the academic year 2015/16 or earlier. The course was offered for the last time in the academic year 2015/16 and a third exam is offered in the academic year 2016/17.</td>
</tr>
</tbody>
</table>
Appendix 3 Description of objectives for the thesis

After completing the thesis, the student should have:

Knowledge about:
- Scientific problems within the study programme’s subject areas.
- A suitable combination of methodologies/theories based on international research for use in his/her work with the problem formulation.
- Theories/models on the basis of an organised value system and with a high degree of independence.

Skills in/to:
- Apply and critically evaluate theories/methodologies, including their applicability and limitations.
- Assess the extent to which the production and interpretation of findings/material depend on the theory/methodology chosen and the delimitation chosen.
- Discuss academic issues arising from the thesis.
- Draw conclusions in a clear and academic manner in relation to the problem formulation and, more generally, considering the topic and the subject area.
- Discuss and communicate the academic and social significance, if any, of the thesis based on ethical principles.

Competences in/to:
- Initiating and performing academic work in a research context.
- Solving complex problems and carry out development assignments in a work context.