Information Meeting – Spring 2021

7 OCTOBER 2020
Agenda

• General Information
  – Application Process, Programmes and Courses
  – Elective Courses
  – Special Studies LTH/ Exchange Studies
• Courses in Mathematics
• Courses in Mathematical Statistics
• Courses in Numerical Analysis
• Courses in Physics
Admission Round for Courses – Spring 2021

• Application round is open 15 September – 15 October on antagning.se

• Programme students
  – Apply primarily within the programme! Some courses are only available within the programme.
  – Programme students have priority.
  – Check the prerequisites that are stated in the course syllabi.

• Stand-alone courses
  – Are available at other departments, no study place guarantee.
  – For courses at LTH not available on antagning.se, apply for special studies at LTH!
Bachelor’s Programme in Mathematics

• 3 years, 180 higher education credits
• 3 main disciplines: Mathematics, Mathematical Statistics, Numerical Analysis

• Structure – for students admitted before Autumn 2020
  – compulsory courses – first year, 60 credits
  – alternative-compulsory courses, 45 credits in mathematics, statistics, numerical analysis - chosen from pre-defined list
  – elective courses, 60 credits – at least 30 credits outside the mathematics
  – Bachelor´s Degree Project, 15 credits – MATK11, MASK11, NUMK11
Bachelor’s Programme in Mathematics

• 3 years, 180 higher education credits
• 3 main disciplines: Mathematics, Mathematical Statistics, Numerical Analysis

• Structure: for students admitted in the Autumn 2020
  – compulsory courses – 75 credits
  – alternative-compulsory courses, 30 credits in mathematics, statistics, numerical analysis - chosen from a pre-defined list
  – elective courses, 60 credits – at least 30 credits outside the mathematics
  – Bachelor’s Degree Project, 15 credits – MATK11, MASK11, NUMK11
Bachelor’s Programme in Mathematics

COMPULSORY COURSES

- First semester
  - MATA21 Analysis in One Variable, 15 credits
  - MATA22 Linear Algebra 1, 7.5 credits
  - NUMA01 Computational Programming with Python, 7.5 credits

- Second semester
  - MATB21 Analysis in Several Variables 1, 7.5 credits – half pace, first half
  - MATB22 Linear Algebra 2, 7.5 credits – half pace, first half
  - MATB23 Analysis in Several Variables 2, 7.5 credits – half pace, second half
  - MATA23 Foundations of Algebra, 7.5 credits - half pace, second half

- Third semester (for students starting in the Autumn 2020)
  - MASA02 Mathematical Statistics, Basic course, 15 credits
Bachelor’s Programme in Mathematics

ALTERNATIVELY COMPULSORY COURSES

- Mathematics
  - MATB24 Linear Analysis, 7.5 credits
  - MATB25 Discrete Mathematics, 7.5 credits (old code MATB13)
  - MATC12 Ordinary Differential Equations 1, 7.5 credits
  - MATM12 Analytic Functions, 15 credits
  - MATM31 Algebraic Structures, 7.5 credits (old code MATM11)
  - MATM35 Number Theory, 7.5 credits (old code MATM15)
Bachelor’s Programme in Mathematics

ALTERNATIVELY COMPULSORY COURSES

- Mathematics – given in Spring 2021
  - MATB24 Linear Analysis, 7.5 credits
  - MATB25 Discrete Mathematics, 7.5 credits (old code MATB13)
  - MATC12 Ordinary Differential Equations 1, 7.5 credits
  - MATM12 Analytic Functions, 15 credits
  - MATM31 Algebraic Structures, 7.5 credits (old code MATM11)
  - MATM35 Number Theory, 7.5 credits (old code MATM15)
Bachelor’s Programme in Mathematics

ALTERNATIVELY COMPULSORY COURSES

➤ Mathematical Statistics
  • MASA02 Mathematical Statistics, Basic Course, 15 credits (compulsory from 2020)
  • MASC01 Probability Theory, 7.5 credits
  • MASC02 Inference Theory, 7.5 credits
  • MASC03 Markov Processes, 7.5 credits
  • MASC04 Stationary Stochastic Processes, 7.5 credits
  • MASC05 Design of Experiments, 7.5 credits
Bachelor’s Programme in Mathematics

ALTERNATIVELY COMPULSORY COURSES

- Mathematical Statistics – given in Spring 2021
  - MASA02 Mathematical Statistics, Basic Course, 15 credits (compulsory from 2020)
  - MASC01 Probability Theory, 7.5 credits, half pace, first half
  - MASC02 Inference Theory, 7.5 credits, half pace, second half
  - MASC03 Markov Processes, 7.5 credits
  - MASC04 Stationary Stochastic Processes, 7.5 credits
  - MASC05 Design of Experiments, 7.5 credits, half pace, second half
Bachelor’s Programme in Mathematics

ALTERNATIVELY COMPULSORY COURSES

- Numerical Analysis
  - NUMA41 Basic Course in Numerical Analysis, 7.5 credits
  - NUMB11 Numerical Linear Algebra, 7.5 credits (old code NUMA11)
  - NUMN19 Numerical Approximation, 7.5 credits
Bachelor’s Programme in Mathematics

ALTERNATIVELY COMPULSORY COURSES

- Numerical Analysis – given in Spring 2021
  - NUMA41 Basic Course in Numerical Analysis, 7.5 credits, half pace, second half
  - NUMB11 Numerical Linear Algebra, 7.5 credits
  - NUMN19 Numerical Approximation, 7.5 credits, half pace, first half
Bachelor’s Programme in Mathematics

ELECTIVE COURSES – 60 CREDITS

• 30 credits must be outside the mathematical disciplines

• More courses in mathematics, statistics and numerical analysis are available

• See complete list of courses on

  http://www.ctr.maths.lu.se/education/mathematics-bachelor-s-programme/courses/

• See recommended study path on

  http://www.maths.lu.se/english/education/mathematics-bachelors-programme/programme-structure/recommended-study-path/
## Complete list of courses

### Mathematical Sciences

#### Bachelor's Programme
- Foundation Studies
- Mathematics
- Information Science
- Statistics
- Degree Project
- Mark Blåkren's Day
- Exchange Studies
- Mathematical Statistics, Master's Programme
- Mathematical Statistics, Bachelor's Programme
- Mathematical statistics, Engineering Programme
- Mathematical statistics courses 2011 and 2012
- All courses
- Master's thesis projects

### Courses

#### Basic Level

<table>
<thead>
<tr>
<th>Course</th>
<th>Code</th>
<th>Credits</th>
<th>Method</th>
</tr>
</thead>
<tbody>
<tr>
<td>Analysis I, Real Numbers, Part 1</td>
<td>MAT151</td>
<td>1.5</td>
<td></td>
</tr>
<tr>
<td>Analysis I, Real Numbers, Part 2</td>
<td>MAT152</td>
<td>2.5</td>
<td></td>
</tr>
<tr>
<td>Analysis II, Complex Numbers</td>
<td>MAT401</td>
<td>1.5</td>
<td></td>
</tr>
<tr>
<td>Analysis III, Functional Analysis</td>
<td>MAT402</td>
<td>10.0</td>
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<tr>
<td>Linear Algebra, Vector Spaces</td>
<td>MAT111</td>
<td>10.0</td>
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<tr>
<td>Calculus of Variations</td>
<td>MAT120</td>
<td>3.5</td>
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<tr>
<td>Numerical Methods</td>
<td>NUM100</td>
<td>3.5</td>
<td></td>
</tr>
<tr>
<td>Complex Analysis, Part 1</td>
<td>MAT160</td>
<td>2.5</td>
<td></td>
</tr>
<tr>
<td>Linear Algebra, Part 1</td>
<td>MAT120</td>
<td>3.5</td>
<td></td>
</tr>
<tr>
<td>Linear Algebra, Part 2</td>
<td>MAT120</td>
<td>3.5</td>
<td></td>
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<tr>
<td>Matrix Algebra</td>
<td>MAT145</td>
<td>7.5</td>
<td></td>
</tr>
<tr>
<td>Mathematical Statistics, Basic Courses</td>
<td>MAT145</td>
<td>7.5</td>
<td></td>
</tr>
<tr>
<td>Model Theory</td>
<td>MAT140</td>
<td>7.5</td>
<td></td>
</tr>
<tr>
<td>Numerical Analysis, Basic Courses</td>
<td>MAT140</td>
<td>7.5</td>
<td></td>
</tr>
<tr>
<td>Fundamental Analysis, Basic Courses</td>
<td>MAT140</td>
<td>7.5</td>
<td></td>
</tr>
<tr>
<td>Ordinary Differential Equations</td>
<td>MAT152</td>
<td>7.5</td>
<td></td>
</tr>
<tr>
<td>Partial Differential Equations</td>
<td>MAT152</td>
<td>7.5</td>
<td></td>
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<tr>
<td>Stochastic Models, Basic Courses</td>
<td>MAT140</td>
<td>7.5</td>
<td></td>
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<tr>
<td>Statistics, Basic Courses</td>
<td>MAT140</td>
<td>7.5</td>
<td></td>
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<tr>
<td>Probability Theory</td>
<td>MAT152</td>
<td>7.5</td>
<td></td>
</tr>
<tr>
<td>Mathematical Statistics, Advanced Courses</td>
<td>MAT145</td>
<td>7.5</td>
<td></td>
</tr>
<tr>
<td>Advanced Level</td>
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</tbody>
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The table above provides a list of courses offered in the Bachelor's Programme of Mathematical Sciences at Lund University. The courses are divided into Basic Level and Advanced Level. Each course includes the code, credits, and method of delivery.
Recommended Study Path

Students admitted to the Bachelor’s Programme in Mathematics before the autumn semester of 2019 are referred to the previously recommended study path.

Students admitted to the Bachelor’s Programme in Mathematics from 2020 are recommended to study according to the study path below.

Year 1 - compulsory courses
The first year of the programme consists of the following compulsory courses in mathematics and computational programming, comprising 60 credits.

Autumn semester

<table>
<thead>
<tr>
<th>Course</th>
<th>Study pace / Semester period</th>
</tr>
</thead>
<tbody>
<tr>
<td>MAT1A1 Analysis in One Variable 1.5 credits</td>
<td>half pace, whole semester</td>
</tr>
<tr>
<td>MAT1A2 Linear Algebra 1. 7.5 credits</td>
<td>half pace, first half</td>
</tr>
<tr>
<td>NUMA01 Computational Programming with Python. 7.5 credits</td>
<td>half pace, second half</td>
</tr>
</tbody>
</table>

Spring semester

<table>
<thead>
<tr>
<th>Course</th>
<th>Study pace / Semester period</th>
</tr>
</thead>
<tbody>
<tr>
<td>MAT1B1 Analysis in Several Variables 1. 7.5 credits</td>
<td>half pace, first half</td>
</tr>
<tr>
<td>MAT1B2 Linear Algebra 2. 7.5 credits</td>
<td>half pace, first half</td>
</tr>
<tr>
<td>MAT1B3 Analysis in Several Variables 2. 7.5 credits</td>
<td>half pace, second half</td>
</tr>
<tr>
<td>MAT1A3 Foundations of Analysis 7.5 credits</td>
<td>half pace, second half</td>
</tr>
</tbody>
</table>

Year 2 - alternative compulsory and optional courses
The last compulsory course in the program is NAS402 Mathematical Statistics, Basic Course 15 credits. The course is given at half pace each autumn semester and can be read in parallel with a couple of other alternative compulsory courses within the programme. After the compulsory courses have been completed, a number of study paths are open within the mathematical disciplines. Courses in pure and applied mathematics, mathematical statistics and numerical analysis are available.

According to the course requirements for a Bachelor’s degree, students should read at least 30 credits additional (alternative compulsory) courses within the mathematical disciplines. Additionally they should read at least 30 credits, and at most 60 credits, optional courses in other subjects.

The list of alternative compulsory courses is specified within the course requirements for a Bachelor’s degree in mathematics. The courses offered in this category comprise more than 30 credits, so students have the opportunity to either focus on a certain area or broaden their knowledge in the mathematical disciplines.
Bachelor’s Programme in Mathematics

ELECTIVE COURSES

- Physics – see [www.fysik.lu.se/english/education](http://www.fysik.lu.se/english/education)

  » Physics 1 (given in Swedish every Autumn, and English every Spring)
    - FYSA12 Introduction to University Physics with General Physics, 15 credits
    - FYSA13 Introduction to University Physics with Optics, Waves and Quantum Physics, 7.5 credits
    - FYSA14 Introduction to University Physics with Thermodynamics, Climate and Experimental Methodology, 7.5 credits

  » Physics 2:
    - Basic Quantum Mechanics, Spring second half
    - Classical Mechanics and Special Relativity, Spring first half
    - More information to follow
Bachelor’s Programme in Mathematics

ELECTIVE COURSES

– Economics – see www.nek.lu.se/en
  » In Swedish
    – NEKA12 – National Economy, Basic Course, 30 credits, consisting of several courses that can be taken separately.
      • Microeconomic Theory with Applications, 11 credits
      • Macroeconomic Theory and Economic Policy, 9 credits
      • International Economics, 5 credits
      • Financial Economics, 5 credits
  » In English
    – Bachelor’s Programme in International Business
    – Bachelor’s Programme in Economy and Society
Bachelor’s Programme in Mathematics

ELECTIVE COURSES

- Special studies LTH – see http://www.student.lth.se/studieinformation/specialstudier/
  » Up to 30 credits, online application
  » You need a letter of attestation from programme coordinator stating that the courses can be included in your programme

- Exchange studies – see https://www.science.lu.se/education/international-opportunities/outgoing-exchange
  » One or two semesters at one of our partner universities
  » You can apply for exchange studies in mathematics (department agreements), science (faculty agreements) or other subject areas (university agreements).
Bachelor’s Programme in Mathematics

ELECTIVE COURSES

– Computer Science – LTH

- EDAA01, Programming continuation course, 7.5 credits, in Swedish, Spring, first half
- EDAF05, Algorithms, Datastructures and Complexity, 5 credits, Spring second half
- EDAF50 C++ Programming, in Swedish, 7.5 credits, Spring, first half
- EDAP01 Artificial Intelligence, 7.5 credits, Spring, first half
- EDAN40 Functional programming, 7.5 credits, Spring, second half
Bachelor’s Programme in Mathematics

DEGREE PROJECT – 15 CREDITS

• Can be done in
  – Mathematics – course code MATK11 (requires 90 credits pure mathematics)
  – Mathematical Statistics - course code MASK11
  – Numerical Analysis – course code NUMK11

• These are only available within the programme! Before you apply contact
  – Anna-Maria Persson for MATK11
  – Magnus Wiktorsson for MASK11
  – Claus Führer för NUMK11
Master’s Programme in Mathematics

• 2 years, 120 higher education credits, starting only in an autumn semester

• Two specialisations: Mathematics and Numerical Analysis

• Structure – for students admitted before 2020
  - alternative-compulsory courses, 45 credits in mathematics/numerical analysis (chosen from pre-defined list, according to your specialisation)
  - elective courses, 45 credits (at most 30 credits at basic level)
  - degree project – Master’s thesis, 30 credits – MATM03 or NUMM03
Master’s Programme in Mathematics

• 2 years, 120 higher education credits, starting only in an autumn semester

• Two specialisations: Mathematics and Numerical Analysis

• Structure – for students admitted Autumn 2020
  - Compulsory and alternative-compulsory courses, 45 credits in mathematics/numerical analysis, chosen from pre-defined list, according to specialisation.
  - elective courses, 45 credits, including additional 15 credits in mathematics statistics and numerical analysis and at most 30 credits at basic level
  - degree project – Master’s thesis, 30 credits – MATM01 or NUMM11
Master’s Programme in Mathematics

• Course selection

  – First semester: courses are selected at the introductory meeting

  – Upcoming semester: you apply for the courses within your programme on antagning.se, deadline 15 October for courses in Spring 2021

  – Follow your specialisation, check prerequisites, consult the student counsellors

  – Practical information: http://www.maths.lu.se/english/education/mathematics-masters-programme
Courses in Mathematics, Spring 2021

UPPER BASIC LEVEL

- MATB21 Analysis in Several Variables 1, 7.5 hp – half pace, first half
- MATB22 Linear Algebra 2, 7.5 hp – half pace, first half
- MATB23 Analysis in Several Variables 2, 7.5 hp – half pace, second half
- MATA23 Foundations of Algebra, 7.5 hp - half pace, second half

- MATB24 Linear Analysis, 7.5 credits - half pace, first half
- MATB25 Discrete Mathematics, 7.5 hp - half pace, second half
- MATC25 Calculus of Variations, 7.5 hp - quarter pace, whole semester
Courses in Mathematics, Spring 2021

ADVANCED LEVEL

- MATM20 Mathematical Modeling, 7.5 credits – half pace, second half
- MATM31 Algebraic Structures, 7.5 credits – half pace, first half
- MATM36 Topology, 7.5 credits – half pace, first half
- MATM37 Ordinary Differential Equations 2, 7.5 credit – half pace, first half
- MATM38 Fourier Analysis, 7.5 credits – half pace, second half
- MATM39 Integration Theory, 7.5 credits – half pace, first half
- MATM43 Specialised Course in Differential Geometry, 7.5 credits – quarter pace, whole semester
- MATM45 Analytic Number Theory, 7.5 credits – half pace, first half
- MATP31 Distribution Theory, 7.5 credits – half pace, second half
- MATP33 Group and Ring Theory, 7.5 credits – half pace, second half
- MATP39 Specialised Course in Integration Theory, 7.5 credits - half pace, second half
Courses in Numerical Analysis, Spring 2021

UPPER BASIC LEVEL

• NUMA41 Basic Course in Numerical Analysis, 7.5 credits – half pace, second half

ADVANCED LEVEL

• NUMN19 Numerical Approximation, 7.5 credits – half pace, first half
• NUMN24 Finite Volume Methods, 7.5 credits – half pace, second half
• NUMN26 Simulation Tools, 7.5 credits – half pace, first half
• NUMN27 Numerical Analysis Seminar Course, 7.5 credits – half pace, second half
Courses in Mathematical Statistics, Spring 2021

UPPER BASIC LEVEL

- MASC01 Probability Theory, 7.5 credits – half pace, first half
- MASC05 Design of Experiments, 7.5 credits – half pace, second half

ADVANCED LEVEL

- MASM11 Monte Carlo Based Statistical Methods, 7.5 credits – half pace, first half
- MASM15 Statistical Modeling of Extreme Values, 7.5 credits – half pace, second half
- MASM22 Linear and Logistic Regression – 7.5 credits, half pace, second half
- MASM27 Non-parametric Inference – 7.5 credits, half pace, first half