Program description for the Master's Degree Program in Mathematics

Name
English: Master's Degree program in Mathematics
Norwegian, bokmål: Masterprogram i matematikk
Norwegian, nynorsk: Masterprogram i matematikk

Qualifications awarded
Master of Science in Mathematics.

Work load
The total work load of the program of study is 120 ECTS.

Learning outcome
The candidate…

Knowledge

- has advanced knowledge within one of the mathematical areas algebra, analysis/differential geometry or applied mathematics.
- has solid knowledge about fields close to the chosen main area.
- has sufficient knowledge of mathematics to teach in senior high school.

Skills

- can enter complicated problem issues, uncover structures and formulate precise problems, find suitable analytical and/or numerical solution methods, and interpret the solutions.
- has good practical skills in using relevant programming tools.
- can cooperate, if necessary in a interdisciplinary way, with other specialists.
- can find precise and scientific formulations, in oral and written language, in Norwegian as well as in English.
- can use existing literature in an active way to understand the work of other scientists, and as support to solve own mathematical problems.

General Competence

- has solid knowledge of a broad variety of methods and techniques for analysis and problem solving within the chosen area of specialization.
- has acquired good theoretical insight and ability to apply the theory for development of methods and techniques to solve problems.
- possesses necessary qualifications for work within industry, technology, science, information technology, and schools.

- can apply knowledge within mathematics and statistics on problem issues within social and natural sciences.
- can do independent scientific work and formulate the contents of the work within the framework of the terminology of the field.
- can make knowledge based judgments on general scientific issues and communicate these in public.

Admission requirements

Admission to the Master's degree program in mathematics requires a Bachelor's degree in mathematics or another degree following a program of study of at least three years, or similar education approved in accordance with the Norwegian Universities Act section 3-4.
Bachelor of Science degree or equivalent

The education must contain a specialization in mathematics corresponding to at least 80 ECTS.

An average mark of "C" or better is required in the Bachelor's degree or similar basis of admission.

Group of students aimed at

The Master's program in mathematics is meant for well-qualified students who has a Bachelor of Science degree in mathematics or equivalent, and who want to acquire specialized knowledge in mathematics. The study program is well suited for candidates who want to continue with research in mathematics, and also for candidates who want to work with people in research institutions, and in private industry as petroleum, finance, communications and computer security. Many mathematicians teach at universities and colleges, others in secondary schools.

Contents and teaching

Students may choose between three specialities; algebra, analysis/differential geometry, or applied mathematics. Some of the special fields include cryptography, number theory, elliptic curves, algebra, differential geometry, complex analysis, non-linear waves and dynamical systems. In applied mathematics thesis topics may relate to plasma physics, optics, mathematical ecology and bioinformatics. The Master´s degree program comprises a Master's thesis of 60 ECTS in addition to mandatory courses and a special curriculum amounting to 60 ECTS. These are dependent upon the speciality chosen.

The courses in mathematics consist of lectures and coursework. A passing grade on the mandatory homework sets is normally required for permission to take the exam.

Program structure:

Algebra

1. semester	MAT-3300 Algebra 2	Elective course	Elective course
2. semester	MAT-3302 Algebraic Geometry	MAT-3304 Advanced Number Theory	Elective course
3. semester	MAT-3900 Master's Thesis in Mathematics		
4. semester			

Algebra is the study of certain mathematical objects and structures of an algebraic or discrete nature. Algebra is an important part of mathematics whose methods and results can be used in such scientific fields as computer science, physics, statistics and other branches of mathematics. The Master's theses are offered in the fields of cryptography/coding theory, algebraic number theory, analysis of algorithms and homological algebra.

If you´re interested, get in touch with professor Trygve Johnsen, professor Andrei Prasolov or associate professor Ragnar Soleng.

The program structure above indicates that at least three of six courses in the program will be courses in algebra at the 3000-level. Other relevant elective courses are MAT-3302 Elliptic curves, MAT-3810 Special syllabus and other courses in mathematics, statistics or computer science at the 2000- or 3000-level.

Analysis/Differential Geometry

1. semester	MAT-3110 Differential Geometry 1	MAT-3300 Algebra 2	Elective course
2. semester	MAT-3111 Differential Geometry 2	Elective course	Elective course
3. semester	MAT-3900 Master's Thesis in Mathematics		
4. semester			

Based on an active research program we can offer a Master's degree program in pure mathematics with specializations in differential geometry. Relevant Master's thesis in differential geometry is focused on mathematical physics, geometrical theory for partial differential equations, dynamic systems, symplectic geometry, almost complex geometry, invariant metrics and geometry of hypersurfaces.

If you´re interested, get in touch with professor Valentin Lychagin, professor Boris Kruglikov or associate professor Marius Overholt.

The program structure above indicates that at least three of six courses in the program will be in analysis/differential geometry at the 3000-level.

Other relevant elective courses are MAT-3100 Integration Theory, MAT-3112 Contact Geometry and Symplectic Geometry, MAT-3113 Nonlinear Partial Differential Equations, MAT-3114 Algebraic Topology, MAT-3120 Groups and Representations, MAT-3810 Special syllabus and other courses in mathematics, statistics or computer science at the 2000- or 3000-level.

Applied mathematics

1. semester	MAT-3200 Mathematical Methods	MAT-3201 Dynamical Systems	Elective course
2. semester	MAT-3202 Nonlinear Waves	Elective course	Elective course
3. semester	MAT-3900 Master's Thesis in Mathematics		

A Master's degree program in applied mathematics is an education where mathematics is combined with programming, computing and visualizations. Interpretations and evaluations of results and their relevance are also included. Candidates with this education are in great demand. The research group in applied mathematics is offering Master's thesis in the fields of plasma physics, optics, mathematical ecology and bioinformatics.

This program demands a bachelor´s degree in mathematics which includes basic courses in physics.

If you´re interested, get in touch with professor Tor Flå or associate professor Per Jakobsen.

The program structure above indicates that at least three of six courses in the program will be in applied mathematics at the 3000-level.

Other relevant elective courses for the program are MAT-3211 Bioinformatics, MAT-3810 Special syllabus and other courses in mathematics, physics, statistics or computer science at the 2000- or 3000-level.

Exam and evaluation
The courses in the program are evaluated in different ways; written exam, oral exam, or written home assignment. An oral exam is most common for the Master´s degree courses. The details of the way the courses are evaluated are contained in the course descriptions.

The Master´s thesis is assessed by a committee based on the thesis itself, an oral presentation of the thesis and an oral exam.

Work practices
No work practice is demanded in this program of study.

Language of instructions and examination
The language of instruction is English and all of the syllabus material is in English. Examination questions will be given in English, but may be answered either in English or a Scandinavian language.

The Master´s thesis may also be written either in English or a Scandinavian language.

Internationalization and student exchange
The Department of Mathematics and statistics is establishing arrangements for student exchange.

Other rules
"Utfyllende bestemmelser for 2-årig masterprogram ved NT-fak" revised at NT-fak, fall 2011.

The study program will be evaluated every year. Each course will be evaluated at least every three times when it is given. Course evaluation consists of the assessments by the students and the course teacher(s). An overview of which courses that is to be evaluated each semester is to be found on the web pages of the faculty in question.

Syllabus
The recommended reading will be available.

Demands for the master's thesis
The Master's thesis MAT-3900 Master's Thesis in Mathematics has a work load of 60 ECTS and is written in two semesters. The thesis is normally written individually, but it is possible to finish the Master's thesis as a part of a group work. The Master's thesis is graded by a letter grade A–F. The grade scale is used according to definitions and guidelines worked out by the national councils for the fields in question.