

Mathematics major 2018-2020

Professor in charge: Juha Kinnunen

Other professors: Chris Brzuska, Alexander Engström, Camilla Hollanti, Riikka Korte, Kaie Kubjas, Kalle Kytölä, Lasse Leskelä

Credits: 55–65 ECTS (long major) or 40–45 ECTS (compact major)

Abbreviation: MA

Code: SCI3054

Objectives

The major in Mathematics helps students develop their mathematical thinking so that they understand how mathematical theories are constructed and how mathematical problems are formulated and solved. The education is research-based with all courses taught by mathematicians who lead active research projects related to the course topics. This major is partly intended as a preparation for students who plan to become researchers or university teachers in mathematics or related sciences. A master's degree in mathematics also provides the student with a broad range of skills in problem solving, logical reasoning, and flexible thinking, which are attributes valued throughout the society. The covered mathematical areas include abstract and commutative algebra, algebraic geometry, complex analysis, differential geometry, graph theory, mathematical physics, partial differential equations, probability theory, and real analysis.

Content and structure

Mathematics is a versatile major: the student has the opportunity to choose her/his field of mathematics with no pre-assigned restrictions. The course content of the major is planned under the supervision of the student's personal academic advisor, with emphasis on the mathematics courses lectured at the Department of Mathematics and Systems Analysis. You have the opportunity to include a minor in your studies. Depending on whether a minor is included or not, the extent of the major is 40–45 credits or 55–65 credits.

Recommended courses include:

Code	Name	ECTS credits	Period	Year
MS-E1050	Graph theory	5	I (2018-2019) II (2019-2020)	1.
MS-E1110	Number theory	5	II (2018-2019) I (2019-2020)	1.
MS-E1111	Galois theory	5	IV (every other year)	1. or 2.
MS-E1142	Computational algebraic geometry	5	I	1. or 2.
MS-E1200	Lie groups and Lie algebras	5	II (every other year)	1. or 2.
MS-E1280	Measure and integral	5	II	1.
MS-E1281	Real analysis	5	IV (every other year)	1. or 2.
MS-E1461	Hilbert spaces	5	I	1.
MS-E1462	Banach spaces	5	II (every other year)	1. or 2.
MS-E1531	Differential geometry	5	III (every other year)	1. or 2.
MS-E1600	Probability theory	5	III	1.
MS-E1602	Large random systems	5	IV (every other year)	1. or 2.
MS-E1687	Advanced topics in cryptography	5	III-IV	1. or 2.
CS-E4555	Combinatorics	5	III-IV	1. or 2.

In addition, the student can take courses in applied mathematics, operations research, or other mathematical sciences.

Examples of possible orientations

MS-E1280 Measure and integral

MS-E1281 Real analysis

MS-E1461 Hilbert spaces

MS-E1462 Banach spaces

MS-E1531 Differential geometry

Other courses, and an optional minor chosen under the guidance of the personal academic advisor.

MS-E1050 Graph theory

MS-E1110 Number theory

MS-E1111 Galois theory

MS-E1200 Lie groups and Lie algebras

Other courses, and an optional minor chosen under the guidance of the personal academic advisor.

MS-E1600 Probability theory

MS-E1602 Large random systems

MS-E1461 Hilbert spaces

Other courses, and an optional minor chosen under the guidance of the personal academic advisor.