☑ MSc Program: Algebra, Geometry and Number Theory

(education in English)

CURRICULUM 2025/2026

Courses	*ECTS-credits*	*Number of classes total*	*per week*
I semester			
C*-algebras (E, gr.5)	7,5	45	3+0+0
Algorithmic methods for solving extremal problems in Ramsey theory (E)	7,5	60	1+3+0
Codes and designs in polynomial metric spaces I (E, gr.2)	7,5	60	3+1+0
Complex Algebraic Geometry (E, gr.4)	7,5	45	3+0+0
Differential equations and applications with Matematica, Matlab or Maple (E, gr.6)	7,5	60	2+0+2
Differential geometry 2 (E, gr.4)	8	60	4+0+0
Finite Geometry (E, gr.2)	7,5	45	3+0+0
Game Theory (E)	7,5	45	3+0+0
Groebner bases (E, gr.1)	7,5	45	3+0+0
Groups representation (E, gr.1)	7,5	45	3+0+0
Introduction to complex manifolds (E)	7,5	45	3+0+0
Introduction to functional analysis (E, gr.5)	8,5	60	3+1+0
Introduction to graph theory(extremal problems (E)	8	60	4+0+0
Lie groups and Lie algebras (E)	8	60	4+0+0
Linear sieve - application (E, gr.3)	7,5	45	3+0+0
Mathematical structures of quantum field theory (E)	7,5	45	3+0+0
Number theory with algorithms (E, gr.3)	7,5	75	3+0+2
Riemannian geometry – selected applications, Bochner theory and vanishing theorems 1 (E, gr.4)	8	60	4+0+0
Some Topics from Algebra II (E, gr.1)	7,5	45	3+0+0
Special functions in Mathematical Physics (E, gr.6)	7,5	60	3+1+0
Strongly regular graphs and association schemes (E, gr.2)	7,5	45	3+0+0
Finite Fields and applications (E, gr.2)	7,5	60	3+1+0
Descriptive Geometry (E, gr.4)	7,5	45	3+0+0
Geometry and topology(E, gr.4)	7,5	45	3+0+0
II semester			
Additive problems in number theory (E, gr.3)	9	60	4+0+0
Algebraic Number Theory (E, gr.3)	8	60	3+1+0
Applied Algebraic Geometry (E, gr.2)	7,5	45	3+0+0
Arithmetic progressions of primes (E, gr.3)	7,5	45	3+0+0
Codes and designs in polynomial metric spaces II (E, gr.2)	7,5	60	3+1+0
Combinatorial ring theory (E, gr.1)	7,5	45	3+0+0
Cryptography (E, gr.2)	7,5	45	3+0+0
Extremal combinatorics (E, gr.2)	7,5	45	3+0+0
Finite groups (E, gr.1)	7,5	45	3+0+0
Functional analysis (E, gr.5)	8,5	60	3+1+0
Galois Theory (E, gr.1)	7,5	45	3+0+0
Generating Functions (E, gr.1)	7,5	45	3+0+0
Hamiltonian systems (E)	7,5	45	3+0+0
Introduction in Ricci flow and Li-Yau inequalities (E)	8	60	4+0+0
Introduction to Analytic Number Theory (E, gr.3)	9	60	4+0+0
Introduction to Commutative Algebra (E, gr.1)	7,5	45	3+0+0
Introduction to Homological Algebra (E, gr.1)	7,5	45	3+0+0
Mathematical Foundations of Quantum			

Mechanics (E)	7,5	45	3+0+0
Measure Theory and Integration (the Lebesgue Integral) (E, gr.5)	8	60	3+1+0
Multiplicative Number Theory (E, gr.3)	9	60	4+0+0
Nonlinear Functional analysis (E, gr.5)	7,5	45	3+0+0
Number theory in school competitive mathematics (E, gr.3)	7,5	45	2+1+0
Representations of compact Lie groups (E)	8	60	4+0+0
Riemannian geometry – selected applications, Bochner theory and vanishing theorems 2 (E, gr.4)	8	60	4+0+0
Seminar on Dynamical systems and Number theory 2 (E)	7,5	45	3+0+0
Several Complex Variables (E)	7,5	45	3+0+0
Sobolev Spaces and Applications in Partial Differential Equations (E, gr.6)	8	75	3+2+0
Some Topics from Algebra I (E, gr.1)	7,5	45	3+0+0
Valuation Theory (E)	8	60	4+0+0
Vector bundles and connections (E, gr.4)	7,5	45	3+0+0
General Relativity (E, gr.6)	7,5	45	3+0+0

III semester

Seminar "Algebra, geometry and number theory" (C)	7,5	45	3+0+0
Course Project (C)	7,5		
Defense of Master's Thesis (C)	15		

C - compulsory course
E, gr.1- elective course from group 1-Algebra
E, gr.2- elective course from group 2- Coding Theory and Combinatorics
E, gr.3- elective course from group 3- Number Theory
E, gr.4- elective course from group 4- Differential Geometry
E, gr.5- elective course from group 5- Mathematical Analysis
E, gr.6- elective course from group 6- Differential Equations
E - elective course outside of the specific groups

Elective courses – selected courses must have minimum 60 Credits. Students have to choose one elective course from four different groups among Group 1, Group 2, Group 3, Group 4, Group 5 and Group 6.

Students can choose up to 4 / four / courses, up to 30 credits in total, from other FMI programs on a list agreed with the head of the master's program.