

Applied Mathematics MSc Program (starting from 2020)

Last update: 20 January 2025

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The duration of the program is 4 semesters. Students have to obtain 120 credit points according to the table below. The following specializations are available: Applied Analysis, Mathematical Data Science, Industrial Mathematics, and Financial Mathematics. Students have to choose a specialization at the end of the first semester.

	Applied Analysis	Mathematical Data Science	Industrial Mathematics	Financial Mathematics
Common obligatory courses	49	49	49	49
Obligatory courses of specialization	38	33	36	39
Elective courses	7	8	9	6
Optional courses	6	10	6	6
Master's Thesis	20	20	20	20
Total	120	120	120	120

Below one can find the details of the 4 specializations. The courses in boldface are compulsory for all specializations; they can be found in Neptun in the curriculum of the Applied Mathematics Program. The rest of the courses belong to the curriculum of the respective specialization. Elective courses are listed at the end of this guide. An optional course can be any course offered by the university. The semesters for the elective and optional courses are only suggestions; students can take those courses in any semester.

Contact hours are given in the format lecture + recitation. In case of a 0, the respective unit does not exist. The last character of the Neptune codes of lectures is E and of recitations is G.

Applied Analysis Specialization

Coordinator: Prof. Tibor Krisztin, krisztin@math.u-szeged.hu

Course name	Course code	Number of hours	Credit	Preliminary requirement
Semester 1				
Algorithms and Their Complexity	MMNKEN11	2 + 2	6	
Applied Analysis	MMNKEN31	2 + 2	6	
Differential Equations	MMNKEN21	2 + 2	6	
Discrete Mathematics	MMNKEN51	2 + 2	6	
Statistical Analysis of Time Series	MMNVEN61	2 + 2	6	
Total in Semester 1			30	
Semester 2				
Functional Analysis	MMNKEN32	2 + 2	6	
Probability Theory	MMNKEN61	3 + 2	7	
Numerical Methods for Differential Equations	MMNVEN21	2 + 2	6	Differential Equations
Dynamical Systems *	MMNVEN24	2 + 2	6	Differential Equations
Numerical Mathematics	MMNVEN22	2 + 1	4	
Total in Semester 2			29	
Semester 3				
Dynamic Modelling	MMNVEN32	2 + 2	6	
Topology and Manifolds	MMNVEN41	2 + 2	6	
Elective and optional courses			9	
Diploma Project	MMNKEN91	0 + 2	10	
Total in Semester 3			31	
Semester 4				
Optimization Methods	MMNKEN52	2 + 2	6	
Nonlinear programming	IMEN223	2 + 1	3 + 1	
Partial Differential Equations *	MMNVEN23	2 + 2	6	Differential Equations
Elective and optional courses			4	
Degree Thesis	MMNKEN92	0 + 2	10	
Total in Semester 4			30	

* The place of the courses Dynamical Systems and Partial Differential Equations is not fixed; sometimes they are offered in the reverse order.

Mathematical Data Science Specialization

Coordinator: Prof. Gergely Röst, rost@math.u-szeged.hu

Course name	Course code	Number of hours	Credit	Preliminary requirement
Semester 1				
Algorithms and Their Complexity	MMNKEN11	2 + 2	6	
Applied Analysis	MMNKEN31	2 + 2	6	
Differential Equations	MMNKEN21	2 + 2	6	
Discrete Mathematics	MMNKEN51	2 + 2	6	
Statistical Analysis of Time Series	MMNVEN61	2 + 2	6	
Total in Semester 1			30	
Semester 2				
Functional Analysis	MMNKEN32	2 + 2	6	
Probability Theory	MMNKEN61	3 + 2	7	
Mathematical Data Science	MMNVEN26	2 + 2	6	
Control Theory *	MMNVEN33	2 + 2	6	Differential Equations
Numerical Mathematics	MMNVEN22	2 + 1	4	
Total in Semester 2			29	
Semester 3				
Data Mining	IMEN210	2 + 2	3 + 2	
Coding Theory	MMNVEN11	2 + 0	3	
Dynamic Modelling	MMNVEN32	2 + 2	6	
Elective and optional courses			6	
Diploma Project	MMNKEN91	0 + 2	10	
Total in Semester 3			30	
Semester 4				
Optimization Methods	MMNKEN52	2 + 2	6	
Artificial Neural Networks and their Applications	IMEN075	2 + 0	3	
Elective and optional courses			12	
Degree Thesis	MMNKEN92	0 + 2	10	
Total in Semester 4			31	

* The place of the course Control Theory is not fixed. Occasionally it is offered in the fourth semester; in this case we suggest to take elective and optional courses for 6 credit points.

Industrial Mathematics Specialization

Coordinator: Prof. Gergely Röst, rost@math.u-szeged.hu

Course name	Course code	Number of hours	Credit	Preliminary requirement
Semester 1				
Algorithms and Their Complexity	MMNKEN11	2 + 2	6	
Applied Analysis	MMNKEN31	2 + 2	6	
Differential Equations	MMNKEN21	2 + 2	6	
Discrete Mathematics	MMNKEN51	2 + 2	6	
Statistical Analysis of Time Series	MMNVEN61	2 + 2	6	
Total in Semester 1			30	
Semester 2				
Functional Analysis	MMNKEN32	2 + 2	6	
Probability Theory	MMNKEN61	3 + 2	7	
Numerical Methods for Differential Equations	MMNVEN21	2 + 2	6	Differential Equations
Control Theory *	MMNVEN33	2 + 2	6	Differential Equations
Numerical Mathematics	MMNVEN22	2 + 1	4	
Total in Semester 2			29	
Semester 3				
Electrodynamics	FMEN514	2 + 0	3	
Theoretical Mechanics	FMEN311	4 + 0	4	
Coding Theory	MMNVEN11	2 + 0	3	
Dynamic Modelling	MMNVEN32	2 + 2	6	
Elective and optional courses			5	
Diploma Project	MMNKEN91	0 + 2	10	
Total in Semester 3			31	
Semester 4				
Optimization Methods	MMNKEN52	2 + 2	6	
Advanced approximate and symbolic computations	IMEN108	2 + 1	3 + 1	
Elective and optional courses			10	
Degree Thesis	MMNKEN92	0 + 2	10	
Total in Semester 4			30	

* The place of the course Control Theory is not fixed. Occasionally it is offered in the fourth semester; in this case we suggest to take elective and optional courses for 6 credit points.

Financial Mathematics Specialization

Coordinator: Prof. Péter Kevei, kevei@math.u-szeged.hu

Course name	Course code	Number of hours	Credit	Preliminary requirement
Semester 1				
Algorithms and Their Complexity	MMNKEN11	2 + 2	6	
Applied Analysis	MMNKEN31	2 + 2	6	
Differential Equations	MMNKEN21	2 + 2	6	
Discrete Mathematics	MMNKEN51	2 + 2	6	
Statistical Analysis of Time Series	MMNVEN61	2 + 2	6	
Total in Semester 1			30	
Semester 2				
Functional Analysis	MMNKEN32	2 + 2	6	
Probability Theory	MMNKEN61	3 + 2	7	
Numerical Methods for Differential Equations	MMNVEN21	2 + 2	6	Differential Equations
Stochastic Processes	MMNVEN63	2 + 2	6	Probability Theory *
Elective and optional courses			4	
Total in Semester 2			29	
Semester 3				
Principles of Economics	GKMEN43	2 + 0	3	
Introduction to Finance	GKMEN15	2 + 0	3	
Financial Mathematics and Ruin Theory	MMNVEN64	2 + 2	6	Stochastic Processes
Elective and optional courses			8	
Diploma Project	MMNKEN91	0 + 2	10	
Total in Semester 3			30	
Semester 4				
Optimization Methods	MMNKEN52	2 + 2	6	
Mathematical Statistics	MMNVEN62	2 + 2	6	Probability Theory
Microeconomics	GKMEN04	2 + 2	3 + 2	Principles of Economics
Corporate Finance 1	GKMEN38	1 + 1	2 + 2	Introduction to Finance
Degree Thesis	MMNKEN92	0 + 2	10	
Total in Semester 4			30	

* One can take the preliminary requirement and the course in the same semester.

Elective courses

The table below contains the list of elective courses. Only those courses are considered elective courses that are not compulsory in the student's specialization.

Course name	Course code	Number of hours	Credit	Preliminary requirement
Coding Theory	MMNVEN11	2 + 0	3	
Numerical Mathematics	MMNVEN22	2 + 1	4	
Partial Differential Equations	MMNVEN23	2 + 2	6	Differential Equations
Dynamical Systems	MMNVEN24	2 + 2	6	Differential Equations
Mathematical Data Science	MMNVEN26	2 + 2	6	
Dynamic Modelling	MMNVEN32	2 + 2	6	
Control Theory	MMNVEN33	2 + 2	6	Differential Equations
Topology and Manifolds	MMNVEN41	2 + 2	6	
Mathematical Statistics	MMNVEN62	2 + 2	6	Probability Theory
Stochastic Processes	MMNVEN63	2 + 2	6	Probability Theory
Financial Mathematics and Ruin Theory	MMNVEN64	2 + 2	6	Stochastic Processes
Electrodynamics	FMEN514	2 + 0	3	
Theoretical Mechanics	FMEN311	4 + 0	4	
Advanced approximate and symbolic computations	IMEN108	2 + 1	3 + 1	
Nonlinear programming	IMEN223	2 + 1	3 + 1	