mathematics

academic
study
program

MATHEMATICS

The program is in tune with the principles of the Bologna Declaration.

- **Study program cycle and type:**

First cycle academic study program.

- Anticipated academic title:

Bachelor in Mathematics (academic).
In Slovenian: *diplomirani matematik (UN), diplomirana matematičarka (UN),* abbreviated to *dipl. mat. (UN).*

- Duration:

3 full years (6 terms) based on 180 ECTS credits.

- Basic goals:

The principal goal of the academic study program in Mathematics is to qualify its graduates for solving hard mathematical problems arising in industry, in the public sector, and in sciences. At the same time, graduates of the program are equipped with the core knowledge necessary for studies in the second cycle.

- Generic competences developed by the student:

- ability of abstract thinking and problem analysis,
- ability of sorting out effective solutions and of their critical evaluation,
- ability of application of knowledge in practice,
- ability of using and following the expert literature,
- ability to set forth both written and oral presentations of specialized topics,
- ability to work both individually and as part of an (international) team,
- ability of lifelong self-education.

- **Subject specific competences developed by the student:**

Mathematics is the link between natural sciences, engineering, social sciences and computer sciences. Therefore, a graduate of the academic study program in Mathematics should be able to:

- model a practical problem mathematically,
- qualitatively analyze the obtained mathematical problems,
- conceive algorithms to solve them,
- implement those algorithms using appropriate programming tools,
- analyze and present the results

- **Employment possibilities:**

Graduates of the academic study program in Mathematics can find employment in:

- the technology and logistic sector of the economy,
- banks and insurance companies,
- research and planning institutions, technology parks, and the public sector.

CURRICULUM

The spreadsheet data are given for both the winter and the summer term.
Each term comprises 15 weeks of classes.

Abbreviations:

L = lectures per week (in hours),
P = problem sessions per week (in hours),
Lab = lab classes per week (in hours),
ECTS = ECTS credits worth,
TSW = estimated total student workload (in hours).

1st YEAR

	Winter term					Summer term					Total	
Course	L	P	Lab	ECTS	TSW	L	P	Lab	ECTS	TSW	ECTS	TSW
Analysis 1	4	4	0	9	270	4	4	0	9	270	18	540
Algebra 1	3	3	0	7	210	3	3	0	7	210	14	420
Logic and sets	2	2	0	6	180	0	0	0	0	0	6	180
Computer lab	1	0	3	6	180	0	0	0	0	0	6	180
Introduction to programming	0	0	0	0	0	2	1	1	6	180	6	180
Physics 1	0	0	0	0	0	3	3	0	6	180	6	180
Elective	1	2	0	2	60	1	2	0	2	60	4	120
Weekly total	**11**	**11**	**3**			**13**	**13**	**1**				
Term total	**165**	**165**	**45**	**30**	**900**	**195**	**195**	**15**	**30**	**900**	**60**	**1800**

Electives

	Winter term					Summer term					Total	
Course	L	P	Lab	ECTS	TSW	L	P	Lab	ECTS	TSW	ECTS	TSW
Proseminar A	2	2	0	2	60	0	2	0	2	60	4	120
Proseminar B	0	2	0	2	60	2	2	0	2	60	4	120

Remark: Proseminars A and B are electives. Proseminar A is intended as a review of selected high school topics in mathematics, while Proseminar B should be chosen by students with strong mathematical background. Problem sessions for both Proseminars are a supplement to the other courses in the first year's curriculum.

	Winter term					Summer term					Total	
Course	L	P	Lab	ECTS	TSW	L	P	Lab	ECTS	TSW	ECTS	TSW
Analysis 2	4	3	0	8	240	4	3	0	6	180	14	420
Physics 2	3	3	0	6	180	0	0	0	0	0	6	180
Algebra 2	3	2	0	6	180	0	0	0	0	0	6	180
Algebra 3	0	0	0	0	0	3	2	0	6	180	6	180
Programming 1	2	1	1	5	150	0	0	0	0	0	5	150
Point-set topology	2	2	0	5	150	0	0	0	0	0	5	150
Seminar 1	0	0	0	0	0	0	0	2	3	90	3	90
Elective 1	0	0	0	0	0	2	2	0	5	150	5	150
Elective 2	0	0	0	0	0	2	2	0	5	150	5	150
Elective 3	0	0	0	0	0	2	2	0	5	150	5	150
Weekly total	**14**	**11**	**1**			**13**	**11**	**2**				
Term total	**210**	**165**	**15**	**30**	**900**	**195**	**165**	**30**	**30**	**900**	**60**	**1800**

Electives

		Winter term					Summer term					Total	
Course	Group	L	P	Lab	ECTS	TSW	L	P	Lab	ECTS	TSW	ECTS	TSW
Discrete mathematics 1	B1	0	0	0	0	0	2	2	0	5	150	5	150
Programming 2	B1	0	0	0	0	0	2	1	1	5	150	5	150
Algebraic curves	B2	0	0	0	0	0	2	2	0	5	150	5	150
Introduction to geometric topology	B2	0	0	0	0	0	2	2	0	5	150	5	150
Affine and projective geometry	B	0	0	0	0	0	2	2	0	5	150	5	150
Coding theory and cryptography	B	0	0	0	0	0	2	2	0	5	150	5	150

Remark: Electives are divided into groups B1, B2, and B. Each student opts for three electives. Of those, at least one must belong to group B1, and at least one to group B2.

3rd YEAR

	Winter term					Summer term					Total	
Course	L	P	Lab	ECTS	TSW	L	P	Lab	ECTS	TSW	ECTS	TSW
Analysis 3	3	3	0	6	180	0	0	0	0	0	6	180
Analysis 4	0	0	0	0	0	3	3	0	6	180	6	180
Introduction to numerical methods	3	3	0	6	180	0	0	0	0	0	6	180
Probability and statistics	2	2	0	5	150	2	2	0	5	150	10	300
Seminar 2	0	0	2	3	90	0	0	1	1	30	4	120
Mechanics 1	2	2	0	5	150	0	0	0	0	0	5	150
Specific elective 1	0	0	0	0	0	2	2	0	5	150	5	150
Specific elective 2	0	0	0	0	0	2	2	0	5	150	5	150
Specific elective 3	0	0	0	0	0	2	2	0	5	150	5	150
Specific elective 4	2	2	0	5	150	0	0	0	0	0	5	150
General elective	0	0	0	0	0	2	0	0	3	90	3	90
Weekly total	**12**	**12**	**2**			**13**	**11**	**1**				
Term total	**180**	**180**	**30**	**30**	**900**	**195**	**165**	**15**	**30**	**900**	**60**	**1800**

Specific electives

		Winter term					Summer					Total	
Course	Group	L	P	Lab	ECTS	TSW	L	P	Lab	ECTS	TSW	ECTS	TSW
Numerical linear algebra	B1	0	0	0	0	0	2	2	0	5	150	5	150
Mechanics 2	B1	0	0	0	0	0	2	2	0	5	150	5	150
Mathematical modelling	B1	0	0	0	0	0	2	2	0	5	150	5	150
Data structures and algorithms 1	B2	2	1	1	5	150	0	0	0	0	0	5	150
Data structures and algorithms 2	B2	0	0	0	0	0	2	1	1	5	150	5	150
Coding theory and cryptography	B2	0	0	0	0	0	2	2	0	5	150	5	150
Discrete mathematics 2	B2	0	0	0	0	0	2	2	0	5	150	5	150
Optimization 1	B2	0	0	0	0	0	2	2	0	5	150	5	150
Database basics	B	0	0	0	0	0	2	1	1	5	150	5	150
Financial mathematics 1	B	0	0	0	0	0	2	2	0	5	150	5	150
Game theory	B	3	3	0	6	180	0	0	0	0	0	6	180
Affine and projective geometry	B	0	0	0	0	0	2	2	0	5	150	5	150
Introduction to differential geometry	B	2	2	0	5	150	0	0	0	0	0	5	150

Remarks:

– Each student opts for at least four electives, at least one (5 ECTS credits worth) in the winter term, and at least three (15 ECTS credits worth) in the summer term. Of the four, one elective must belong to group B1 and one to group B2. Repetition of previous year's electives is not possible.

– Electives can also be chosen from among the courses offered in the second cycle of this program, subject to approval by the department study committee.

– The 3 ECTS credits corresponding to the general elective course can be earned by completing exams within other study programs.

– Students studying at a foreign institution as part of the Socrates-Erasmus exchange program can transfer up to 30 ECTS credits awarded at that institution in the case of a single term exchange or 60 ECTS credits in the case of a full year exchange.

COURSE DESCRIPTIONS

1st year

Analysis 1

- Number of ECTS credits: 18
- Course goals and competences: Familiarity with the rudiments of mathematical analysis: limits, continuity, derivation and integration of functions of one real variable, number and function series, metric spaces.
- Remark: Analysis 1 is one of the core courses in mathematical studies.
- Responsible faculty: Prof. Miran Černe, Prof. Franc Forstnerič and Prof. Josip Globevnik.

Algebra 1

- Number of ECTS credits: 14
- Course goals and competences: Familiarity with the basic concepts of linear algebra; vectors, vector spaces, linear maps and matrices. Development of the mathematically correct way of thinking about problems. Familiarity with the strict mathematical language. Acquisition of practical working knowledge of the subject by means of problem sessions.
- Remark: Algebra 1 is one of the core courses in mathematical studies.
- Responsible faculty: Prof. Boris Lavrič.

Logic and sets

- Number of ECTS credits: 6
- Course goals and competences: Familiarity with the concept of mathematical proof, with basic discrete structures, combinatorial concepts and the basics of set theory.
- Responsible faculty: Prof. Andrej Bauer and Prof. Marko Petkovšek.

Computer lab

- Number of ECTS credits: 6
- Course goals and competences: Acquisition by the student of the basic knowledge about the software they will use in the course of their studies. Capacity to use the internet, email and electronic lists, as well as numerical software used in analysis and algebra. Understanding and the capacity to use operational systems. Capacity to use word processors with the emphasis on creating and editing mathematical texts.
- Responsible faculty: Prof. Andrej Bauer and Dr. Matjaž Zaveršnik.

Introduction to programming

- Number of ECTS credits: 6
- Course goals and competences: Familiarity with basic programming methods, and the basics of programming languages. Understanding the concept of an algorithm. Familiarity with command line and functional programming.
- Responsible faculty: Prof. Andrej Bauer.

Physics 1

- Number of ECTS credits: 6
- Course goals and competences: Students enhance the knowledge of basic physics by the use of concrete examples and experiments. They learn the methods for measuring different physical quantities. The acquired knowledge of physics serves as a basis for the application of numerical mathematical methods. Students learn the methodology of application of physical theories by observation and study of natural phenomena. This comprises the development of a theoretical model, the definition of the physical quantities and variables presented in the model, the application of mathematical tools, and comparison of the outcome with the quantities obtained by measuring. The topics discussed in class are selected from heat theory and mechanics.
- Responsible faculty: Prof. Anton Ramšak, Dr. Andreja Šarlah and Dr. Gregor Skačej.

Proseminar A

- Number of ECTS credits: 4
- Course goals and competences: Review of high school mathematics needed for other courses in the first year of the study program.
- Responsible faculty: Prof. Petar Pavešić.

Proseminar B

- Number of ECTS credits: 4
- Course goals and competences: Deeper understanding of various concepts from Analysis 1 and Algebra 1, advanced knowledge of select topics from the two subjects, and development of a better understanding of the material by working on concrete examples.
- Responsible faculty: Prof. Miran Černe, Prof. Franc Forstnerič, Prof. Josip Globevnik and Prof. Boris Lavrič.

2nd year

Analysis 2

- Number of ECTS credits: 14
- Course goals and competences: Familiarity with differential and integral calculus of functions of several variables. Familiarity with the basics of differential geometry of curves and surfaces and the theory of integration on curves and surfaces, familiarity with the basics of vector analysis and the basic theory of holomorphic functions of one complex variable.
- Responsible faculty: Prof. Miran Černe, Prof. Franc Forstnerič and Prof. Josip Globevnik.

Physics 2

- Number of ECTS credits: 6
- Course goals and competences: The general goals and competences are the same as those of Physics 1. The topics discussed in class are the following: electric and magnetic fields, electric oscillations, waves, optics, and special relativity.
- Responsible faculty: Prof. Anton Ramšak, Dr. Andreja Šarlah and Dr. Gregor Skačej.

Algebra 2

- Number of ECTS credits: 6
- Course goals and competences: Understanding and the capacity to use the basic notions and structures of abstract algebra needed for further studies in mathematics. Development of abstract thinking and familiarity with the strict mathematical language. Acquisition of practical working knowledge by means of problem sessions. The topics discussed in class are selected from group theory and ring theory.
- Responsible faculty: Prof. Matjaž Omladič.

Algebra 3

- Number of ECTS credits: 6
- Course goals and competences: The general goals and competences are the same as those of Algebra 2. The topics discussed in class are the following: category theory, modules, nets, and fields.
- Responsible faculty: Prof. Matjaž Omladič

Programming 1

- Number of ECTS credits: 5
- Course goals and competences: Familiarity with the basics of structural programming and some basic data structures and algorithms.
- Responsible faculty: Prof. Andrej Bauer in Prof. Tomaž Pisanski.

Point-set topology

- Number of ECTS credits: 5
- Course goals and competences: Familiarity with the basic concepts of point-set topology such as connectedness, compactness, separation axioms, and topology of product and function spaces.
- Responsible faculty: Prof. Petar Pavešić.

Seminar 1

- Number of ECTS credits: 3
- Course goals and competences: Students learn how to prepare short mathematical presentations. By using their own experience and by observation of others, students learn both how to design a presentation and prepare the corresponding material (e.g. transparencies) as well as how to execute it. They

acquire the skills needed for a successful presentation and a well written seminar paper. The coordinator of the seminar selects sufficiently many short self-contained topics with adequate references to the literature.
- Responsible faculty: Prof. George Mejak, Prof. Bor Plestenjak and Prof. Tomaž Košir.

> Discrete mathematics 1
- Number of ECTS credits: 5
- Course goals and competences: Familiarity with basic discrete structures and combinatorics, as well as elementary graph theory.
- Responsible faculty: Prof. Martin Juvan and Prof. Marko Petkovšek.

> Programming 2
- Number of ECTS credits: 5
- Course goals and competences: Familiarity with programming methods related to specific areas in computer and information technologies. Familiarity with modular programming, design and organization of large programming units, interfaces, encapsulation, generic programming and generic packages, the basics of relational databases and SQL, event programming and graphical user interfaces (GUIs), markup and structured documents, programming of web applications, servers and clients.
- Responsible faculty: Prof. Andrej Bauer.

> Algebraic curves
- Number of ECTS credits: 5
- Course goals and competences: Development by the student of a geometric way of thinking. Familiarity with basic notions and properties of algebraic curves.
- Responsible faculty: Prof. Tomaž Košir and Prof. Pavle Saksida.

> Introduction to geometric topology
- Number of ECTS credits: 5
- Course goals and competences: Familiarity with the basic properties of the topology of Euclidean spaces and the basic concepts of geometric topology; Jordan's closed curve theorem, Brouwer's fixed point theorem, simplicial complexes, polyhedra and manifolds.
- Responsible faculty: Prof. Petar Pavešić.

> Affine and projective geometry
- Number of ECTS credits: 5
- Course goals and competences: Students learn the basics of affine and projective geometry by using the familiar tools of abstract and linear algebra. They also develop a geometric intuition.
- Responsible faculty: Prof. Tomaž Košir.

Coding theory and cryptography

- Number of ECTS credits: 5
- Course goals and competences: Familiarity with the basics of coding theory - information and entropy; Shannon's theory; error-correcting codes; upper bounds on number of code-words; linear, Hamming's, cyclic and Reed Muller code. Familiarity with the basics of cryptography - private key systems; RSA and public key systems; hash functions; digital signatures; distribution and key exchange; secret identification, verification, and sharing; pseudo-random generators.
- Responsible faculty: Prof. Andrej Bauer and Prof. Martin Juvan.

3rd year

Analysis 3

- Number of ECTS credits: 6
- Course goals and competences: Students learn about differential equations and their solutions. They learn how to handle specific types of differential equations with the emphasis on linear differential equations. They also learn the basics of variational calculus, and the notion of a derivative of an operator between Banach spaces.
- Responsible faculty: Prof. Miran Černe, Prof. Bojan Magajna and Prof. Pavle Saksida.

Analysis 4

- Number of ECTS credits: 6
- Course goals and competences: Students learn the basic theory of partial differential equations and their relations with physics. First order and second order partial differential equations for functions of two variables are studied, with emphasis on the Laplace, heat and wave equations, and properties of their solutions. The classical Fourier series, and Fourier and Laplace transformations are introduced.
- Responsible faculty: Prof. Miran Černe, Prof. Bojan Magajna and Prof. Pavle Saksida.

Introduction to numerical methods

- Number of ECTS credits: 6
- Course goals and competences: Students learn the basics of numerical computations. In more detail, they learn about the floating point and about numerical solutions of linear and non-linear systems. Students also learn the basic methods for computation of eigenvalues, interpolation, numerical integration and solving ordinary differential equations. Students get a better understanding of the material by solving homework problems and using computer software packages for numerical computations.
- Responsible faculty: Prof. Bor Plestenjak.

> Probability and statistics

Number of ECTS credits: 10

– Course goals and competences: In the first part, the students learn the basics of probability theory. These include the notions of a sample space, events and their probability, and, with special emphasis, the notion of a random variable and its distribution. The notions of mathematical expectation, conditional expectation and conditional distribution follow next, and the probability part is rounded up with the concept of convergence of random variables and the central limit theorem. In the second part, students use sampling to learn about the basic notions of statistics: test statistic, sampling distribution, standard error and confidence interval, the notion of a statistical model and the related notion of statistical inference. Regression models of different kinds are among the most used statistical models. The last part of the course comprises the basic notions and examples of hypotheses testing.

– Responsible faculty: Prof. Matjaž Omladič and Prof. Mihael Perman.

> Seminar 2

– Number of ECTS credits: 4

– Course goals and competences: In the course of the seminar, each student conducts and presents their senior seminar project. The preparation starts in the winter term of the seminar and is finalized in the summer term. In collaboration with other members of the department, the seminar coordinator prepares a sufficient number of self-contained topics together with references to the basic literature. Students are then urged to find and use additional sources of literature.

– Responsible faculty: Prof. George Mejak, Prof. Bor Plestenjak and Prof. Tomaž Košir.

> Mechanics 1

– Number of ECTS credits: 5

– Course goals and competences: Familiarity with the basics of Newtonian mechanics with the emphasis on mathematical rigor and the interplay of previously acquired mathematical knowledge.

– Responsible faculty: Prof. George Mejak.

> Numerical linear algebra

– Number of ECTS credits: 5

– Course goals and competences: Students learn about numerical computations of eigenvalues and eigenvectors. This knowledge gives a different perspective on certain topics studied in Algebra 1 and Introduction to numerical methods. Students get a better understanding of the material by solving homework problems and by solving problems using computing environments MATLAB and Mathematica.

– Responsible faculty: Prof. Bor Plestenjak.

Mechanics 2

- Number of ECTS credits: 5
- Course goals and competences: The course is designed as an introduction to the basic notions of qualitative analysis of non-linear systems, with the emphasis on applications in mechanics. The basic notions are: dynamical systems, phase space, stability of linearized systems, basics of bifurcation theory, averaging methods and perturbation methods.
- Responsible faculty: Prof. Igor Dobovšek.

Mathematical modelling

- Number of ECTS credits: 5
- Course goals and competences: Students learn the basic approaches to solving the problems of mathematical modelling. They learn how to use MATLAB as a tool for critically evaluating the obtained results. Students get a more detailed insight into certain problems, involving extremal values of smooth functions, problems in variational calculus and simulations.
- Responsible faculty: Prof. George Mejak.

Data structures and algorithms 1

- Number of ECTS credits: 5
- Course goals and competences: Students learn about the basic data structures and related algorithms used in programming. They get familiar with the mathematical analysis of correctness as well as time and space complexity of algorithms.
- Responsible faculty: Prof. Martin Juvan and Prof. Jernej Kozak.

Data structures and algorithms 2

- Number of ECTS credits v: 5
- Course goals and competences: Students learn more about the basic data structures and related algorithms used in programming. They get familiar with the mathematical analysis of correctness as well as time and space complexity of algorithms.
- Responsible faculty: Prof. Martin Juvan and Prof. Jernej Kozak.

Discrete mathematics 2

- Number of ECTS credits: 5
- Course goals and competences: Students get an overview of discrete mathematics: discrete geometry, combinatorics, and graph theory. Connections with other mathematical fields are emphasized.
- Responsible faculty: Prof. Martin Juvan and Prof. Primož Potočnik.

> Optimization 1

- Number of ECTS credits: 5
- Course goals and competences: Students learn about the optimization problem, they learn how to translate concrete problems into optimization problems, and are taught how to solve linear optimization problems.
- Responsible faculty: Prof. Martin Juvan.

> Database basics

- Number of ECTS credits: 5
- Course goals and competences: Students get familiar with the concepts of data and information, with organization of logical and physical databases, as well as with many basic database models. They acquire the knowledge of structured query languages such as SQL. They get a detailed knowledge of the functioning of database management systems.
- Responsible faculty: Prof. Andrej Bauer.

> Financial mathematics 1

- Number of ECTS credits: 5
- Course goals and competences: Financial mathematics is based on certain common principles. The goal of this course is to introduce those principles on discrete models which are the most intuitive. The first part comprises the mathematics of life insurance and the principle of equivalence. The question of investments leads to that of market models, optimal investment choice, basic theorem about option pricing and risk measures. An important element of financial mathematics is the development of stochastic interest rate models.
- Responsible faculty: Prof. Andrej Bauer, Prof. Martin Juvan, Prof. Matjaž Omladič, Prof. Mihael Perman, Prof. Marko Petkovšek and Prof. Primož Potočnik.

> Game theory

- Number of ECTS credits: 6
- Course goals and competences: Students learn the basics of game theory and its use in modelling different situations, with the emphasis on economy and finance.
- Responsible faculty: Prof. Martin Juvan.

> Introduction to differential geometry

- Number of ECTS credits: 5
- Course goals and competences: Students acquire knowledge of the basic notions of differential geometry: metric, curvature and geodesics. These notions are defined and studied on surfaces, since they present the easiest nontrivial examples in differential geometry. The notions are mostly introduced extrinsically. Nonetheless, the students develop an understanding of the distinction between extrinsic and intrinsic. The Gauss-Bonnet theorem is used to emphasize the relation between the geometry and topology of surfaces. The acquired knowledge (particularly of metric and curvature) is considerably deep in comparison to Analysis 2.
- Responsible faculty: Prof. Pavle Saksida.

Admission requirements and admission limitation measures

Admission to the study program is open to the following:
a) Holders of the *matura* certificate.
b) Holders of the *vocational matura* certificate obtained in any of the four-year high school programs. In this case, an additional examination in one of the general *matura* subjects different from those of the *vocational matura* is required. Either one of the *vocational matura* subjects or the additional one must be mathematics.
c) Holders of the final examination certificate obtained in any of the four-year high school programs prior to 1 June 1995.

In case the number of applicants exceeds the maximum availability, the applicants are selected according to their final *matura* (or *vocational matura*) grade, their mathematics *matura (or vocational matura)* grade, their grade point average (GPA) in the last two years of high school, and their final mathematics grades in the last two years of high school. These are weighted in the following way.

Applicants under a)	
– *Matura* certificate grade	30 % of points
– *Matura* mathematics exam grade	30 % of points
– GPA in the 3rd and 4th years of high school	20 % of points
– Final grade in mathematics in the 3rd and 4th years of high school	20 % of points;
Applicants under b)	
– *Vocational matura* grade	20 % of points
– *Matura or vocational matura* mathematics exam grade	40 % of points
– GPA in the 3rd and 4th years of high school	10 % of points
– Final grade in mathematics in the 3rd and 4th years of high school	30 % of points;
Applicants under c)	
– Final examination grade	30 % of points
– Mathematics final examination grade or mathematics grade in the 4th year of high school in case of exemption from the final exam	30 % of points
– GPA in the 3rd and 4th years of high school	20 % of points
– Final mathematics grade in the 3rd and 4th years of high school	20 % of points

Enrollment requirements

Enrollment in the first study year is granted upon admission.
For enrollment in the next study year it is necessary to earn 48 ECTS credits from courses and exams in the current study year.

In addition to the credit quota, the completions of the following exams are obligatory:
– for enrollment in the 2nd year: Analysis 1, Algebra 1, and Computer lab,
– for enrollment in the 3rd year: Analysis 2, Algebra 2, Programming 1, and Point-set topology.

Re-enrollment requirements

For re-enrollment in the same study year, a student needs to earn:
a) at least half of all possible credits of the current study year (30 ECTS credits), and
b) all credits from the previous study years.
Re-enrollment is only possible once in the course of studies. A change of the study program as result of disability of enrollment in the next study year is automatically counted as re-enrollment.

Finishing requirements

To finish the program, students need to complete all exams.

Validation of competences, knowledge, and skills acquired prior to admission to the study program

Students may apply for validation of their competences acquired previously by means of various forms of education if their competences match those of one or more courses offered within this study program. In a formal written request submitted to the mathematics department at the FMF, the applicant must specify the course(s) whose competences he or she had already mastered, and attach accredited transcripts proving it. When considering the possible validation of competences corresponding to a particular course, the department study committee bases its decision on a comparison of
– the duration of the educational process where the student acquired the competences with the duration of the respective course(s), and
– the scope of the previously acquired competences with the goals of the respective course(s).
If the study committee decides to validate the previously acquired competences, the student is awarded all ECTS credits that correspond to the respective course(s). In the validation process, the study committee follows *The rules and guidelines for validation of informally acquired knowledge and skills*, accepted by the Senate of The University of Ljubljana on 29 May 2007 (http://www.uni-lj.si/o_univerzi_v_ljubljani/statut_in_pravilniki.aspx).

Grading system:

The methods for testing the competences, knowledge, and skills are described in the courses syllabi. The basic knowledge testing rules are explained in the Exam guidelines of the FMF. Course examinations are either written or oral or both. They can have the form of midterm exams, oral defense of midterm exams, written exams, oral exams, seminar or project work and oral defense of seminar and project work. Grading is based on the grading scale determined in the Statute of The University of Ljubljana. All forms of examinations are graded by grades 1-10, out of which 6-10 are passing grades, and 1-5 are failing grades. The following grading scale is most commonly used for grading the score of a written course examination:

Score (in %)	grade
50 - 59 %	6
60 - 69 %	7
70 - 79 %	8
80 - 89 %	9
90 - 100 %	10