COURSE DESCRIPTIONS OF SUBJECTS

COURSE DESCRIPTION

Name of the higher education institution: University of Presov	
Name of the faculty/university workplace: Faculty of Humanities and Natural Sciences	
Course code: 2MAT/USTMA	**Course title:** Introduction to study of mathematics

Type, scope and method of educational activity:
Total hours: 150
Number of contact teaching hours: 40

- Lecture: 2 hours a week = 20 hours
- Exercise: 2 hours a week = 20 hours

Individual preparation for exercise: 40 hours
Self-study and exam preparation: 70 hours
Method of educational activity: combined

Number of credits: 5

Recommended semester: 1.

Degree of study: 1.

Prerequisites:

Conditions for passing the course:
The subject is finished with an exam. During the semester, the student independently solves assigned tasks, presents their solutions in exercises and completes written tests consisting of tasks corresponding to the content of the curriculum. During the exam period, the student completes the written and oral part of the exam. The final assessment includes the assessment from written tests (40% of all points), the written part of the exam (30% of all points) and the oral part of the exam (30% of all points). In order to pass the exam, it is necessary to obtain at least 25% of the points intended for the interim written tests and at least 50% of the points intended for the oral part of the exam. The final evaluation is given by the sum of points. A student is assessed with classification grade
A if he obtains at least 90% of all points,
B if he obtains at least 80% and less than 90% of all points,
C if he obtains at least 70% and less than 80% of all points,
D if he obtains at least 60% and less than 70% of all points,
E if he obtains at least 50% and less than 60% of all points.
If the student obtains less than 50% of all points or less than 25% of the points intended for the interim written tests or less than 50% of the points intended for the oral part of the exam, or does not participate in classes without relevant reason for at least 3 weeks, he will be evaluated with the grade FX.

Learning outcomes:
A graduate of the subject can/knows to:

Knowledge
- define basic operations with propositions and sets,

- define basic number sets,
- define an arithmetic and geometric sequences and their basic characteristics,
- classify elementary functions, describe their characteristics and formulate their properties,
- determine the method of solving a given equation, inequality or system of equations or inequalities,
- define the term complex number,
- classify conic sections.

Skills
- find out whether the propositional formula represents a tautology,
- verify the validity of given relationships between sets,
- determine the characteristics of arithmetic and geometric sequences,
- sketch graphs of elementary functions, implement appropriate transformations of graphs,
- solve different types of equations, inequalities and their systems,
- calculate with powers and square roots, complex numbers, vectors,
- determine the equations of conic sections, determine the type of conic section.

Competences
- master the notation of basic mathematical concepts,
- adopt the culture of mathematical expression,
- solve tasks aimed at using the concepts listed in the brief outline of the subject and interpret the obtained results,
- orient himself in terminology, argue, assess the truth and falsity of statements, give examples and counterexamples.

Course content: Basics of propositional calculus. Basic operations with sets. Numerical sets. Arithmetic and geometric sequences. Elementary functions and some of their properties. Solving various types of equations and inequalities (linear, quadratic, polynomial, exponential, logarithmic, trigonometric, irrational, with absolute value) and their systems. Complex numbers. Selected parts from analytic geometry (vectors and operations with them, conics).

Recommended literature:

BAČA, M., BUŠA, J., FEŇOVČÍKOVÁ, A., KIMÁKOVÁ, Z., OLEKŠÁKOVÁ, D., SCHRÖTTER, Š. (2011): Zbierka riešených a neriešených úloh z matematiky pre uchádzačov o štúdium na TU v Košiciach. TU v Košiciach.
BÁLINT, Ľ., a kol. (1997): Zbierka úloh z matematiky na prijímacie skúšky na stredné školy. SPN Bratislava.
BRAJERČÍK, J., DEMKO, M. (2018): Matematika pre študentov prírodovedných odborov (biológia - ekológia - geografia), 1. časť (elektronický dokument). PU v Prešove.
BRAJERČÍK, J., MAJHEROVÁ, M., LITECKÁ, J. (2023): Matematika pre študentov prírodovedných odborov (biológia - ekológia - fyzika - geografia - technika), 2. časť (elektronický dokument). PU v Prešove.
DUPLÁK, J., a kol. (2001): Zbierka úloh z matematiky na prijímacie pohovory. KM FHPV PU v Prešove.
POLÁK, J. (2008): Přehled středoškolské matematiky. PROMETHEUS, Praha.
POLÁK, J. (1999): Středoškolská matematika v úlohách II. PROMETHEUS, Praha.
TEPLIČKA, I. (2019): Matematika. Enigma Publishing.

Mathematics textbooks and collections of mathematics tasks for grammar schools and other high schools.

Language which is necessary to complete the course: Slovak

Notes:

Course evaluation
Total number of students evaluated:

A	B	C	D	E	FX

Lecturers: doc. Mgr. Ján Brajerčík, Ph.D., prof. Oksana Mulesa, Dr.Sc.

Date of last change: 30.10.2024

Approved by: doc. Mgr. Ján Brajerčík, Ph.D.

COURSE DESCRIPTION

Name of the higher education institution: University of Presov	
Name of the faculty/university workplace: Faculty of Humanities and Natural Sciences	
Course code: 2MAT/ALGB1	**Course title:** Algebra 1

Type, scope and method of educational activity:
Total hours: 150
Number of contact teaching hours: 40

- Lecture: 2 hours a week = 20 hours
- Exercise: 2 hours a week = 20 hours

Individual preparation for exercise: 40 hours
Self-study and exam preparation: 70 hours
Method of educational activity: combined

Number of credits: 5

Recommended semester: 1.

Degree of study: 1.

Prerequisites:

Conditions for passing the course:
The subject is finished with an exam. During the semester, the student independently solves assigned tasks, presents their solutions in exercises and completes written tests consisting of tasks corresponding to the content of the curriculum. During the exam period, the student completes the written and oral part of the exam. The final assessment includes the assessment from written tests (40% of all points), the written part of the exam (30% of all points) and the oral part of the exam (30% of all points). In order to pass the exam, it is necessary to obtain at least 25% of the points intended for the interim written tests and at least 50% of the points intended for the oral part of the exam. The final evaluation is given by the sum of points. A student is assessed with classification grade
A if he obtains at least 90% of all points,
B if he obtains at least 80% and less than 90% of all points,
C if he obtains at least 70% and less than 80% of all points,
D if he obtains at least 60% and less than 70% of all points,
E if he obtains at least 50% and less than 60% of all points.
If the student obtains less than 50% of all points or less than 25% of the points intended for the interim written tests or less than 50% of the points intended for the oral part of the exam, or does not participate in classes without relevant reason for at least 3 weeks, he will be evaluated with the grade FX.

Learning outcomes:
A graduate of the subject can/knows to:

Knowledge
- define and interpret basic terms from elementary number theory in own words,

- formulate mathematical theorems from elementary number theory and demonstrate their proofs (quotient remainder theorem, fundamental theorem of arithmetic, Fermat's little theorem),
- define, interpret and give an example of a mapping (injection, surjection, bijection, inverse mapping), relation (equivalence, partial ordering, quotient set), binary operation,
- define a group, a field, give examples and basic statements regarding these algebraic structures.

Skills
- work with congruences, with the field of equivalence classes, solve simple Diophantine equations,
- calculate with complex numbers, work with complex numbers in algebraic and trigonometric form and represent them in the Gaussian plane,
- use the Gauss elimination method to solve systems of linear equations over the field of real numbers, complex numbers and over the field of equivalence classes.

Competences
- apply theoretical knowledge when solving tasks from elementary number theory; use different types of proofs (direct, by contradiction, mathematical induction),
- orient himself in terminology, argue, prove mathematical theorems, assess the truth and falsity of statements, give examples and counterexamples.

Course content: Divisibility in the field of integers, the fundamental theorem of arithmetic, congruences. Mappings (injection, surjection, bijection, inverse mapping), relations (equivalence, partial ordering), quotient set, equivalence classes. Binary operations, group, subgroup, group of transformations, field, the field of complex numbers. Systems of linear equations over the field, Gauss elimination method.

Recommended literature:
BIRKHOFF, G., Mac LANE, S. (1979): Prehľad modernej algebry. Alfa, Bratislava.
FADDEJEV, A.K., SOMINSKIJ, J.S. (1986): Zbierka úloh z vyššej algebry. Alfa, Bratislava.
KATRIŇÁK, T. a kol. (1985): Algebra a teoretická aritmetika (1). Alfa, Bratislava.
MIHÓK, P., LIHOVÁ, J., CECHLÁROVÁ, K. (1991): Zbierka úloh z algebry. UPJŠ Košice.
ZNÁM, Š. (1977): Teória čísel. Alfa, Bratislava.

Language which is necessary to complete the course: Slovak

Notes:

Course evaluation
Total number of students evaluated:

A	B	C	D	E	FX

Lecturers: prof. Oksana Mulesa, Dr.Sc., Mgr. Mária Majherová, PhD.

Date of last change: 30.10.2024

Approved by: doc. Mgr. Ján Brajerčík, Ph.D.

COURSE DESCRIPTION

Name of the higher education institution: University of Presov	
Name of the faculty/university workplace: Faculty of Humanities and Natural Sciences	
Course code: 2MAT/ALGB2	**Course title:** Algebra 2

Type, scope and method of educational activity:
Total hours: 120
Number of contact teaching hours: 30

- Lecture: 2 hours a week = 20 hours
- Exercise: 1 hour a week = 10 hours

Individual preparation for exercise: 30 hours
Self-study and exam preparation: 60 hours
Method of educational activity: combined

Number of credits: 4

Recommended semester: 2.

Degree of study: 1.

Prerequisites: Algebra 1 (2MAT/ALGB1)

Conditions for passing the course:
The subject is finished with an exam. During the semester, the student independently solves assigned tasks, presents their solutions in exercises and completes written tests consisting of tasks corresponding to the content of the curriculum. During the exam period, the student completes the written and oral part of the exam. The final assessment includes the assessment from written tests (40% of all points), the written part of the exam (30% of all points) and the oral part of the exam (30% of all points). In order to pass the exam, it is necessary to obtain at least 25% of the points intended for the interim written tests and at least 50% of the points intended for the oral part of the exam. The final evaluation is given by the sum of points. A student is assessed with classification grade
A if he obtains at least 90% of all points,
B if he obtains at least 80% and less than 90% of all points,
C if he obtains at least 70% and less than 80% of all points,
D if he obtains at least 60% and less than 70% of all points,
E if he obtains at least 50% and less than 60% of all points.
If the student obtains less than 50% of all points or less than 25% of the points intended for the interim written tests or less than 50% of the points intended for the oral part of the exam, or does not participate in classes without relevant reason for at least 3 weeks, he will be evaluated with the grade FX.

Learning outcomes:
A graduate of the subject can/knows to:

Knowledge

- define vector space and subspace, give examples of vector spaces and subspaces, assess whether the given structure is (not) a vector space, or subspace,
- define and explain by examples the notions linear combination of vectors, linear hull of a set of vectors, linear dependence, independence of vectors, basis of a vector space,
- prove basic mathematical theorems (intersection of subspaces is a subspace, Steinitz theorem, theorem about the uniqueness of the coordinates of a vector with respect to a given base, fundamental theorem on linear mappings, Frobenius theorem, theorem on the representation of finite-dimensional vector spaces, theorem on the dimension of the linear sum of subspaces, assertion that row-equivalent matrices represent the same subspace),
- find out the properties of a linear mapping using its matrix, prove the theorem on the relationship between the dimension of the kernel and the image of a linear mapping.

Skills
- explain and use examples to demonstrate the construction of a linear and direct sums of subspaces,
- decide whether the given subsets of the space (do not) form a subspace,
- work with matrices (sum, product, inverse matrix, determinant), proof that square matrices over a field form a vector space,
- use matrix notation for systems of linear equations, calculate the dimension of the space of all solutions of a homogeneous system of linear equations,
- determine whether a given linear mapping is an isomorphism, apply the relationship between the composition of a linear mappings and the product of matrices, between the inverse linear mapping and the inverse matrix when solving problems.

Competences
- assess whether the given mapping is a linear mapping,
- apply theoretical knowledge when solving tasks about vector spaces, use different types of proofs (direct, by contradiction, mathematical induction),
- orient himself in terminology, argue, prove mathematical theorems, assess the truth and falsity of assertions, give examples and counterexamples.

Course content: Vector space, basis, subspaces. Matrices, linear mappings and matrices, linear transformation matrix with respect to a given basis. Systems of linear equations, Frobenius theorem, determinant of a matrix, Cramer's rule.

Recommended literature:

BEČVÁŘ, J. (2010): Lineární algebra. MATFYZPRESS, Praha.
BIRKHOFF, G., Mac LANE, S. (1979): Prehľad modernej algebry. Alfa, Bratislava.
ELIÁŠ, J., HORVÁTH, J., KAJAN, J. (1966): Zbierka úloh z vyššej matematiky 1. Alfa, Bratislava.
FADDEJEV, A.K., SOMINSKIJ, J.S. (1986): Zbierka úloh z vyššej algebry. Alfa, Bratislava.
KATRIŇÁK, T. a kol. (1985): Algebra a teoretická aritmetika (1). Alfa, Bratislava.
KORBAŠ, J. (2003): Lineárna algebra a geometria I. Univerzita Komenského Bratislava.
MIHÓK, P., LIHOVÁ, J., CECHLÁROVÁ, K. (1991): Zbierka úloh z algebry. UPJŠ Košice.
ZLATOŠ, P. (2011): Lineárna algebra a geometria. Marenčin PT, Bratislava.

Language which is necessary to complete the course: Slovak

Notes:

Course evaluation

Total number of students evaluated:

A	B	C	D	E	FX

Lecturers: doc. Mgr. Ján Brajerčík, Ph.D.

Date of last change: 30.10.2024

Approved by: doc. Mgr. Ján Brajerčík, Ph.D.

COURSE DESCRIPTION

Name of the higher education institution: University of Presov	
Name of the faculty/university workplace: Faculty of Humanities and Natural Sciences	
Course code: 2MAT/MATA1	**Course title:** Mathematical analysis 1

Type, scope and method of educational activity:
Total hours: 150
Number of contact teaching hours: 40

- Lecture: 2 hours a week = 20 hours
- Exercise: 2 hours a week = 20 hours

Individual preparation for exercise: 40 hours
Self-study and exam preparation: 70 hours
Method of educational activity: combined

Number of credits: 5

Recommended semester: 2.

Degree of study: 1.

Prerequisites:

Conditions for passing the course:
The subject is finished with an exam. During the semester, the student independently solves assigned tasks, presents their solutions in exercises and completes written tests consisting of tasks corresponding to the content of the curriculum. During the exam period, the student completes the written and oral part of the exam. The final assessment includes the assessment from written tests (40% of all points), the written part of the exam (30% of all points) and the oral part of the exam (30% of all points). In order to pass the exam, it is necessary to obtain at least 25% of the points intended for the interim written tests and at least 50% of the points intended for the oral part of the exam. The final evaluation is given by the sum of points. A student is assessed with classification grade
A if he obtains at least 90% of all points,
B if he obtains at least 80% and less than 90% of all points,
C if he obtains at least 70% and less than 80% of all points,
D if he obtains at least 60% and less than 70% of all points,
E if he obtains at least 50% and less than 60% of all points.
If the student obtains less than 50% of all points or less than 25% of the points intended for the interim written tests or less than 50% of the points intended for the oral part of the exam, or does not participate in classes without relevant reason for at least 3 weeks, he will be evaluated with the grade FX.

Learning outcomes:
A graduate of the subject can/knows to:

Knowledge
- formulate the axioms of real numbers,

- define the concepts of a sequence of real numbers, limit of a sequence, boundedness and convergence of a sequence, continuity of a function, derivative of a function and explain their meaning,
- formulate theorems on limits of sequences, convergence of monotonic sequences,
- formulate and prove the basic properties of continuous functions on a closed interval.

Skills
- find the supremum and the infimum of a set and prove this statement,
- explain the way of defining a power with a real exponent,
- calculate some limits of sequences and functions,
- apply basic formulas and rules of differentiation to calculate the derivative of a function and derivatives of higher orders,
- determine the continuity of the function,
- use differential calculus to find intervals of monotonicity, convexity and concavity of a function, local extrema and inflection points.

Competences
- investigate the behaviour of a function and draw its graph,
- apply theoretical knowledge when solving tasks on local and global extrema of a function,
- orient himself in terminology, argue, prove mathematical theorems, assess the truth and falsity of statements, give examples and counterexamples.

Course content: Axioms of real numbers, operations, ordering. Sequence of real numbers, limit of sequence. Boundedness and convergence of sequences. Theorems on limits of sequences. Convergence of monotonic sequences.
A function of one real variable. Limit of a function, theorems on limits. Continuity of a function at a point and on a set. Properties of continuous functions on an interval.
Derivation of a function, its geometric meaning. Basic formulas and rules of differentiation, derivatives of higher orders and their applications. Investigation of the behaviour of a function (monotonicity, local extrema, convexity and concavity, inflection points). Theorems on the mean value of a function. L'Hospital rule.

Recommended literature:

BERMAN, G.N. (1955): Zbierka úloh z matematickej analýzy. SNTL, Bratislava.
BRUCKNER, A.M., BRUCKNER J.B., THOMSON, B.S. (2008): Real Analysis, Second Edition, ClassicalRealAnalysis.com.
ELIÁŠ, J., HORVÁTH, J., KAJAN, J., (ŠULKA, R.) (1966): Zbierka úloh z vyššej matematiky 1-(4). Alfa, Bratislava.
JARNÍK, V. (1974): Diferenciální počet I. Academia, Praha.
KLUVÁNEK, I., MIŠÍK, L., ŠVEC, M. (1965): Matematika I. SVTL, Bratislava.
MIHALÍKOVÁ, B., OHRISKA, J. (1999): Matematická analýza 1. Prírodovedecká fakulta UPJŠ, Košice.
NEUBRUNN, T., VENCKO, J. (1989): Matematická analýza 1. MFF Univerzita Komenského, Bratislava.

Language which is necessary to complete the course: Slovak

Notes:

Course evaluation
Total number of students evaluated:

A	B	C	D	E	FX

Lecturers: prof. Oksana Mulesa, Dr.Sc.

Date of last change: 30.10.2024

Approved by: doc. Mgr. Ján Brajerčík, Ph.D.

COURSE DESCRIPTION

Name of the higher education institution: University of Presov	
Name of the faculty/university workplace: Faculty of Humanities and Natural Sciences	
Course code: 2MAT/ALGB3	**Course title:** Algebra 3
Type, scope and method of educational activity: Total hours: 120 Number of contact teaching hours: 30 • Lecture: 2 hours a week = 20 hours • Exercise: 1 hour a week = 10 hours Individual preparation for exercise: 30 hours Self-study and exam preparation: 60 hours Method of educational activity: combined	
Number of credits: 4	
Recommended semester: 3.	
Degree of study: 1.	
Prerequisites:	
Conditions for passing the course: The subject is finished with an exam. During the semester, the student independently solves assigned tasks, presents their solutions in exercises and completes written tests consisting of tasks corresponding to the content of the curriculum. During the exam period, the student completes the written and oral part of the exam. The final assessment includes the assessment from written tests (40% of all points), the written part of the exam (30% of all points) and the oral part of the exam (30% of all points). In order to pass the exam, it is necessary to obtain at least 25% of the points intended for the interim written tests and at least 50% of the points intended for the oral part of the exam. The final evaluation is given by the sum of points. A student is assessed with classification grade A if he obtains at least 90% of all points, B if he obtains at least 80% and less than 90% of all points, C if he obtains at least 70% and less than 80% of all points, D if he obtains at least 60% and less than 70% of all points, E if he obtains at least 50% and less than 60% of all points. If the student obtains less than 50% of all points or less than 25% of the points intended for the interim written tests or less than 50% of the points intended for the oral part of the exam, or does not participate in classes without relevant reason for at least 3 weeks, he will be evaluated with the grade FX.	
Learning outcomes: A graduate of the subject can/knows to: Knowledge	

- define, give examples and prove the basic properties of algebraic structures with one binary operation (groupoid, semigroup, monoid, group) and with two binary operations (ring, integral domain, field),
- define a subring, a subfield, give examples, explain the concept of a subring generated by a set, give examples,
- explain and use examples to demonstrate the concepts of the order of an element in ring, characteristic of a ring, describe rings (fields) with an infinite characteristic and with a prime characteristic, finite fields,
- explain the construction of the polynomial ring of in one indeterminate and several indeterminates,
- characterize irreducible polynomials over an algebraically closed field, the field of real and complex numbers,
- prove basic mathematical theorems on algebraic structures (theorem on the unique decomposition of a polynomial into a product of irreducible polynomials, theorem on the number of elements of a finite field).

Skills
- describe properties and master calculations in the polynomial ring (greatest common divisor, least common multiple of polynomials, Euclid's algorithm for polynomials), use Horner's method,
- determine the roots of polynomials, check whether the root is multiple, calculate the rational roots of a polynomial with integer coefficients,
- solve binomial equations, quadratic equations, cubic equations, reciprocal equations over the field of complex numbers.

Competences
- apply theoretical knowledge when solving tasks about corresponding algebraic structures; use different types of proofs (direct, by contradiction, mathematical induction),
- orient himself in terminology, argue, prove mathematical theorems, assess the truth and falsity of statements, give examples and counterexamples.

Course content: Group, subgroup, groups of transformations, isomorphism of groups, Cayley's theorem. Ring, integral domain, isomorphism of rings, subrings. Ring element order, ring characteristics, finite fields. Polynomial ring, divisibility in polynomial ring, roots of polynomials, decomposition of a polynomial into irreducible factors. Polynomials of multiple indeterminates, symmetric polynomials. Binomial equations, equations of 2nd, 3rd and 4th degree, reciprocal equations.

Recommended literature:

BEČVÁŘ, J. (2010): Lineární algebra. MATFYZPRESS, Praha.
BIRKHOFF, G., Mac LANE, S. (1979): Prehľad modernej algebry. Alfa, Bratislava.
ELIÁŠ, J., HORVÁTH, J., KAJAN, J. (1966): Zbierka úloh z vyššej matematiky 1. Alfa, Bratislava.
FADDEJEV, A.K., SOMINSKIJ, J.S. (1986): Zbierka úloh z vyššej algebry. Alfa, Bratislava.
KATRIŇÁK, T. a kol. (1985): Algebra a teoretická aritmetika (1). Alfa, Bratislava.
KORBAŠ, J. (2003): Lineárna algebra a geometria I. Univerzita Komenského Bratislava.
MIHÓK, P., LIHOVÁ, J., CECHLÁROVÁ, K. (1991): Zbierka úloh z algebry. UPJŠ Košice.
ZLATOŠ, P. (2011): Lineárna algebra a geometria. Marenčin PT, Bratislava.

Language which is necessary to complete the course: Slovak

Notes:

Course evaluation
Total number of students evaluated:

A	B	C	D	E	FX

Lecturers: doc. Mgr. Ján Brajerčík, Ph.D.

Date of last change: 30.10.2024

Approved by: doc. Mgr. Ján Brajerčík, Ph.D.

COURSE DESCRIPTION

Name of the higher education institution: University of Presov	
Name of the faculty/university workplace: Faculty of Humanities and Natural Sciences	
Course code: 2MAT/MATA2	**Course title:** Mathematical analysis 2

Type, scope and method of educational activity:
Total hours: 150
Number of contact teaching hours: 40

- Lecture: 2 hours a week = 20 hours
- Exercise: 2 hours a week = 20 hours

Individual preparation for exercise: 40 hours
Self-study and exam preparation: 70 hours
Method of educational activity: combined

Number of credits: 5

Recommended semester: 3.

Degree of study: 1.

Prerequisites: Mathematical analysis 1 (2MAT/MATA1)

Conditions for passing the course: The subject is finished with an exam. During the semester, the student independently solves assigned tasks, presents their solutions in exercises and completes written tests consisting of tasks corresponding to the content of the curriculum. During the exam period, the student completes the written and oral part of the exam. The final assessment includes the assessment from written tests (40% of all points), the written part of the exam (30% of all points) and the oral part of the exam (30% of all points). In order to pass the exam, it is necessary to obtain at least 25% of the points intended for the interim written tests and at least 50% of the points intended for the oral part of the exam. The final evaluation is given by the sum of points. A student is assessed with classification grade
A if he obtains at least 90% of all points,
B if he obtains at least 80% and less than 90% of all points,
C if he obtains at least 70% and less than 80% of all points,
D if he obtains at least 60% and less than 70% of all points,
E if he obtains at least 50% and less than 60% of all points.
If the student obtains less than 50% of all points or less than 25% of the points intended for the interim written tests or less than 50% of the points intended for the oral part of the exam, or does not participate in classes without relevant reason for at least 3 weeks, he will be evaluated with the grade FX.

Learning outcomes:
A graduate of the subject can/knows to:

Knowledge
- define the concepts of primitive function and indefinite integral,
- formulate the basic properties of indefinite integral,

- define the concept of a definite integral, explain the method of its construction (using upper and lower integral sums as well as integral sums) and formulate its properties,
- explain the basic geometric meaning of a definite integral,
- define the concept of an improper integral on an infinite interval or from an unbounded function and its geometric meaning,
- define the concept of an infinite series and formulate the necessary condition for the convergence of the series.

Skills
- calculate the indefinite integral of some functions using basic formulas, integration rules, the substitution method and the per partes method,
- calculate the definite integral of some functions using the Newton-Leibniz formula,
- determine the area of given plane figures, the length of the curve, the volume and the surface of the rotating body,
- calculate the improper integral,
- determine the sum of some infinite series.

Competences
- apply theoretical knowledge when solving tasks related to differential and integral calculus,
- present applications of a definite integral in mathematics,
- using corresponding criteria, decide on the convergence of some infinite series,
- orient himself in terminology, argue, prove mathematical theorems, assess the truth and falsity of statements, give examples and counterexamples.

Course content: Taylor polynomial. Primitive function and indefinite integral. Basic formulas and rules of integration. Substitution method and per partes method.
Newton-Leibniz formula, substitution method and per partes method for definite integrals. Applications of the definite integral (area of plane figures, curve length, volume and surface of rotating bodies). Improper integral. Number series. Absolutely and relatively convergent series. Convergence criteria.

Recommended literature:

BERMAN, G.N. (1955): Zbierka úloh z matematickej analýzy. SNTL, Bratislava.
BRUCKNER, A.M., BRUCKNER J.B., THOMSON, B.S. (2008): Real Analysis, Second Edition, ClassicalRealAnalysis.com.
ELIÁŠ, J., HORVÁTH, J., KAJAN, J., (ŠULKA, R.) (1966): Zbierka úloh z vyššej matematiky 1-(4). Alfa, Bratislava.
JARNÍK, V. (1974): Diferenciální počet I. Academia, Praha.
JARNÍK, V. (1956): Integrální počet I. ČSAV, Praha.
KLUVÁNEK, I., MIŠÍK, L., ŠVEC, M. (1965): Matematika I. SVTL, Bratislava.
MIHALÍKOVÁ, B., OHRISKA, J. (1999): Matematická analýza 1. Prírodovedecká fakulta UPJŠ, Košice.
MIHALÍKOVÁ, B., OHRISKA, J. (2007): Matematická analýza 2. Prírodovedecká fakulta UPJŠ Košice.
NEUBRUNN, T., VENCKO, J. (1989): Matematická analýza 1, 2. MFF Univerzita Komenského, Bratislava.

Language which is necessary to complete the course: Slovak

Notes:

Course evaluation
Total number of students evaluated:

A	B	C	D	E	FX

Lecturers: prof. Oksana Mulesa, Dr.Sc.

Date of last change: 30.10.2024

Approved by: doc. Mgr. Ján Brajerčík, Ph.D.

COURSE DESCRIPTION

Name of the higher education institution: University of Presov	
Name of the faculty/university workplace: Faculty of Humanities and Natural Sciences	
Course code: 2MAT/GEOM1	**Course title:** Geometry 1

Type, scope and method of educational activity:
Total hours: 150
Number of contact teaching hours: 40

- Lecture: 2 hours a week = 20 hours
- Exercise: 2 hours a week = 20 hours

Individual preparation for exercise: 40 hours
Self-study and exam preparation: 70 hours
Method of educational activity: combined

Number of credits: 5

Recommended semester: 4.

Degree of study: 1.

Prerequisites:

Conditions for passing the course:
The subject is finished with an exam. During the semester, the student independently solves assigned tasks, presents their solutions in exercises and completes written tests consisting of tasks corresponding to the content of the curriculum. During the exam period, the student completes the written and oral part of the exam. The final assessment includes the assessment from written tests (40% of all points), the written part of the exam (30% of all points) and the oral part of the exam (30% of all points). In order to pass the exam, it is necessary to obtain at least 25% of the points intended for the interim written tests and at least 50% of the points intended for the oral part of the exam. The final evaluation is given by the sum of points. A student is assessed with classification grade
A if he obtains at least 90% of all points,
B if he obtains at least 80% and less than 90% of all points,
C if he obtains at least 70% and less than 80% of all points,
D if he obtains at least 60% and less than 70% of all points,
E if he obtains at least 50% and less than 60% of all points.
If the student obtains less than 50% of all points or less than 25% of the points intended for the interim written tests or less than 50% of the points intended for the oral part of the exam, or does not participate in classes without relevant reason for at least 3 weeks, he will be evaluated with the grade FX.

Learning outcomes:
A graduate of the subject can/knows to:

Knowledge

- define the basic concepts of affine and Euclidean geometry (affine space and its subspace, coordinate system, dividing ratio, half-space, convexity, angle, Euclidean space, scalar product, length, distance, perpendicularity in Euclidean spaces),
- analytically describe affine spaces and their subspaces, half-spaces and angles,
- formulate statements regarding the content of the curriculum and provide their proofs.

Skills
- express the coordinates of a point in different coordinate systems,
- determine the mutual position of the subspaces of the affine space,
- determine the dividing ratio of an ordered triple of points, the orientation of the affine space,
- calculate vector length, distance, angle size in Euclidean spaces,
- determine the affine and convex hull of a set of points,
- to determine the perpendicularity of subspaces of Euclidean spaces.

Competences
- interpret the geometric meaning of solving a system of linear equations,
- give examples of affine spaces with the required properties,
- apply theoretical knowledge when solving tasks related to the content of the curriculum.

Course content: Affine spaces, subspaces, analytical expression of subspaces, mutual position of subspaces of an affine space, dividing ratio, half spaces, convexity of sets, angle, oriented angle. Euclidean spaces, length, size, perpendicularity, distance in Euclidean spaces, vector product.

Recommended literature:

DUPLÁK, J. (2003): Afinné a Euklidovské priestory. FHPV PU, Prešov.
HEJNÝ, M., a kol. (1983): Geometria I. SPN, Bratislava.
SEKANINA, M., a kol. (1986): Geometria I. SPN, Praha.
ZLATOŠ, P. (2011): Lineárna algebra a geometria. Marenčin PT, Bratislava.

Language which is necessary to complete the course: Slovak

Notes:

Course evaluation

Total number of students evaluated:

A	B	C	D	E	FX

Lecturers: doc. Mgr. Ján Brajerčík, Ph.D.

Date of last change: 30.10.2024

Approved by: doc. Mgr. Ján Brajerčík, Ph.D.

COURSE DESCRIPTION

Name of the higher education institution: University of Presov	
Name of the faculty/university workplace: Faculty of Humanities and Natural Sciences	
Course code: 2MAT/MATA3	**Course title:** Mathematical analysis 3

Type, scope and method of educational activity:
Total hours: 120
Number of contact teaching hours: 30

- Lecture: 2 hours a week = 20 hours
- Exercise: 1 hour a week = 10 hours

Individual preparation for exercise: 30 hours
Self-study and exam preparation: 60 hours
Method of educational activity: combined

Number of credits: 4

Recommended semester: 4.

Degree of study: 1.

Prerequisites: Mathematical analysis 2 (2MAT/MATA2)

Conditions for passing the course: The subject is finished with an exam. During the semester, the student independently solves assigned tasks, presents their solutions in exercises and completes written tests consisting of tasks corresponding to the content of the curriculum. During the exam period, the student completes the written and oral part of the exam. The final assessment includes the assessment from written tests (40% of all points), the written part of the exam (30% of all points) and the oral part of the exam (30% of all points). In order to pass the exam, it is necessary to obtain at least 25% of the points intended for the interim written tests and at least 50% of the points intended for the oral part of the exam. The final evaluation is given by the sum of points. A student is assessed with classification grade
A if he obtains at least 90% of all points,
B if he obtains at least 80% and less than 90% of all points,
C if he obtains at least 70% and less than 80% of all points,
D if he obtains at least 60% and less than 70% of all points,
E if he obtains at least 50% and less than 60% of all points.
If the student obtains less than 50% of all points or less than 25% of the points intended for the interim written tests or less than 50% of the points intended for the oral part of the exam, or does not participate in classes without relevant reason for at least 3 weeks, he will be evaluated with the grade FX.

Learning outcomes:
A graduate of the subject can/knows to:

Knowledge
- determine a suitable method for calculating an indefinite integral,

- define the concept of differential equation, functional sequence, functional, power and Taylor series,
- formulate convergence and uniform convergence criteria of functional sequence and functional series.

Skills
- calculate an indefinite integral of rational functions and some types of irrational and trigonometric functions,
- find the decomposition of the rational function into partial fractions,
- solve differential equations with separated variables, separable and linear differential equations,
- determine convergence and uniform convergence of functional sequences and functional series,
- determine the area of convergence of the functional series.

Competences
- apply differential equations and their solutions to real situations in sciences,
- present the application of functional sequences and series in mathematics and other sciences,
- orient himself in terminology, argue, prove mathematical theorems, assess the truth and falsity of statements, give examples and counterexamples.

Course content: Calculation of the indefinite integral of rational functions and some types of irrational and trigonometric functions. Differential equations with separated variables, separable and linear differential equation, applications of differential equations. Functional sequences. Uniform convergence of functional sequences. Functional series. Uniform convergence of functional series. The area of convergence of functional series. Power series, Taylor series of functions.

Recommended literature:

BERMAN, G.N. (1955): Zbierka úloh z matematickej analýzy. SNTL, Bratislava.
BRUCKNER, A.M., BRUCKNER J.B., THOMSON, B.S. (2008): Real Analysis, Second Edition, ClassicalRealAnalysis.com.
ELIÁŠ, J., HORVÁTH, J., KAJAN, J., (ŠULKA, R.) (1966): Zbierka úloh z vyššej matematiky 2-(4). Alfa, Bratislava.
JARNÍK, V. (1956): Integrální počet I. ČSAV, Praha.
KLUVÁNEK, I., MIŠÍK, L., ŠVEC, M. (1965): Matematika I. SVTL, Bratislava.
MIHALÍKOVÁ, B., OHRISKA, J. (1999): Matematická analýza 1. Prírodovedecká fakulta UPJŠ, Košice.
MIHALÍKOVÁ, B., OHRISKA, J. (2007): Matematická analýza 2. Prírodovedecká fakulta UPJŠ Košice.
NEUBRUNN, T., VENCKO, J. (1989): Matematická analýza 1, 2. MFF Univerzita Komenského, Bratislava.

Language which is necessary to complete the course: Slovak

Notes:

Course evaluation
Total number of students evaluated:

A	B	C	D	E	FX

Lecturers: prof. Oksana Mulesa, Dr.Sc.

Date of last change: 30.10.2024

Approved by: doc. Mgr. Ján Brajerčík, Ph.D.

COURSE DESCRIPTION

Name of the higher education institution: University of Presov	
Name of the faculty/university workplace: Faculty of Humanities and Natural Sciences	
Course code: 2MAT/GEOM2	**Course title:** Geometry 2

Type, scope and method of educational activity:
Total hours: 120
Number of contact teaching hours: 30

- Lecture: 2 hours a week = 20 hours
- Exercise: 1 hour a week = 10 hours

Individual preparation for exercise: 30 hours
Self-study and exam preparation: 60 hours
Method of educational activity: combined

Number of credits: 4

Recommended semester: 5.

Degree of study: 1.

Prerequisites: Geometry 1 (2MAT/GEOM1)

Conditions for passing the course:
The subject is finished with an exam. During the semester, the student independently solves assigned tasks, presents their solutions in exercises and completes written tests consisting of tasks corresponding to the content of the curriculum. During the exam period, the student completes the written and oral part of the exam. The final assessment includes the assessment from written tests (40% of all points), the written part of the exam (30% of all points) and the oral part of the exam (30% of all points). In order to pass the exam, it is necessary to obtain at least 25% of the points intended for the interim written tests and at least 50% of the points intended for the oral part of the exam. The final evaluation is given by the sum of points. A student is assessed with classification grade
A if he obtains at least 90% of all points,
B if he obtains at least 80% and less than 90% of all points,
C if he obtains at least 70% and less than 80% of all points,
D if he obtains at least 60% and less than 70% of all points,
E if he obtains at least 50% and less than 60% of all points.
If the student obtains less than 50% of all points or less than 25% of the points intended for the interim written tests or less than 50% of the points intended for the oral part of the exam, or does not participate in classes without relevant reason for at least 3 weeks, he will be evaluated with the grade FX.

Learning outcomes:
A graduate of the subject can/knows to:

Knowledge

- define basic notions (affine mappings and isometries, affine, equiform and Euclidean group, generator of mapping group, invariant of affine mapping, direct and indirect affinities, similarity and isometry of shapes in Euclidean spaces),
- formulate statements regarding the content of the curriculum and provide their proofs,
- analytically describe affine mappings,
- define some types of affine mapping (parallel projection, perspective affinity, symmetry by a subspace, translation, rotation).

Skills
- find out the invariants of affine mappings,
- use theorems on similarity and isometry of shapes to determine the relevant relationships between shapes,
- determine equations, matrices and determinants of affine mappings.

Competences
- classify affine mappings in spaces with dimension 1 and 2,
- give examples of affine mappings with the required properties,
- apply theoretical knowledge when solving tasks related to the content of the curriculum.

Course content: Affine mappings and isometries, their analytical expression and classification. Affine, equiform and Euclidean groups and their generators. Invariants of affine mappings. Isometry and similarity of shapes.

Recommended literature:

DUPLÁK, J. (2005): Zobrazenia a kužeľosečky. FHPV PU, Prešov.
CHALMOVIANSKY, P. (2010): Geometria afinných zobrazení euklidovských priestorov. UK Bratislava.
SEKANINA, M., a kol. (1988): Geometria II. SPN, Praha.
ŠEDIVÝ, O., a kol. (1987): Geometria II. SPN, Bratislava.
ZLATOŠ, P. (2011): Lineárna algebra a geometria. Marenčin PT, Bratislava.

Language which is necessary to complete the course: Slovak

Notes:

Course evaluation

Total number of students evaluated:

A	B	C	D	E	FX

Lecturers: doc. Mgr. Ján Brajerčík, Ph.D.

Date of last change: 30.10.2024

Approved by: doc. Mgr. Ján Brajerčík, Ph.D.

COURSE DESCRIPTION

Name of the higher education institution: University of Presov	
Name of the faculty/university workplace: Faculty of Humanities and Natural Sciences	
Course code: 2MAT/PRST1	**Course title:** Probability and statistics 1

Type, scope and method of educational activity:
Total hours: 120
Number of contact teaching hours: 30

- Lecture: 2 hours a week = 20 hours
- Exercise: 1 hour a week = 10 hours

Individual preparation for exercise: 30 hours
Self-study and exam preparation: 60 hours
Method of educational activity: combined

Number of credits: 4

Recommended semester: 5.

Degree of study: 1.

Prerequisites:

Conditions for passing the course:
The subject is finished with an exam. In total, the student can get 100 points (20 for examinations during the semester and 80 for the final exam). The final evaluation is given by the sum of points. A student is assessed with classification grade
A if he obtains at least 90% of all points,
B if he obtains at least 80% and less than 90% of all points,
C if he obtains at least 70% and less than 80% of all points,
D if he obtains at least 60% and less than 70% of all points,
E if he obtains at least 50% and less than 60% of all points.
If the student obtains less than 50% of all points or or does not participate in classes without relevant reason for at least 3 weeks, he will be evaluated with the grade FX.

Learning outcomes:
A graduate of the subject can/knows to:

Knowledge
- estimate the probability of various events,
- give examples of an possible events,
- define and explain basic terms such as classical, geometric, conditional probability,
- give examples of individual types of probability,
- state the difference between a discrete and a continuous random variable,
- to estimate the characteristics of distributions.

Skills
- solve problems related to probability in different areas,

- to determine different measures in geometric probability,
- describe the properties and master the calculation of numerical characteristics of discrete and continuous random variables.

Competences
- apply theorems about probability in different areas.

Course content Random events, definitions of probability, conditional probability, complete probability theorem, Bayes theorem, discrete and continuous random variable (distribution law, density, distribution function) and its numerical characteristics, some types of distributions (binomial, Poisson, geometric, uniform, normal, chi-square), limit theorems.

Recommended literature:

HENDL, J. (2006): Přehled statistickych metod zpracování dat: analýza a metaanalýza dat. Portál, Praha.
HENDL, J. (2005): Kvalitativní výzkum: základní metody a aplikace. Portál, Praha.
MAREK, L. (2012): Pravdepodobnost. Professional Publishing, Praha.
PLOCKI, A. (2004): Pravdepodobnosť okolo nás. KU, Ružomberok.
RIEČAN, B., LAMOŠ, F. (1992): Pravdepodobnosť a matematická štatistika. Alfa, Bratislava.

Language which is necessary to complete the course: Slovak

Notes:

Course evaluation
Total number of students evaluated:

A	B	C	D	E	FX

Lecturers: Mgr. Mária Majherová, PhD.

Date of last change: 30. 10. 2024

Approved by: doc. Mgr. Ján Brajerčík, Ph.D.

COURSE DESCRIPTION

Name of the higher education institution: University of Presov	
Name of the faculty/university workplace: Faculty of Humanities and Natural Sciences	
Course code: 2MAT/SMBP1	**Course title:** Bachelor's thesis seminar 1
Type, scope and method of educational activity: Total hours: 60 Number of contact teaching hours: 10 • Seminar: 1 hour a week = 10 hours Individual preparation for seminar: 50 hours Method of educational activity: combined	
Number of credits: 2	
Recommended semester: 5.	
Degree of study: 1.	
Prerequisites:	
Conditions for passing the course: The subject is completed with the assessment of passed. Students write a seminar paper on a given topic, part of which can be part of a bachelor's thesis: a) students submit a seminar paper to teacher printed on deadline. b) the scope of work is determined by the teacher, c) it is necessary to observe the technique and ethics of citing in the work. • Seminar paper must have the following structure: 1. The front section: a) a cover (title of paper, name and surname of the author, year). b) a cover page (title of paper, name and surname of the teacher, subject, name and surname of the student, field of study, year). c) content (includes the names of the main parts and subparts of paper with page numbers, list of attachments and an indication of their location in paper). d) list of illustrations and list of tables (if the tables and figures are in the paper, indicates an exhaustive list of their names). e) list of abbreviations and symbols (if the signs, symbols and short names are in the paper and they are not common to the reader and immediately understandable, they must be explained in this section). 2. The core of paper (main text): a) Introduction (applies to specific processed topic and gives the reader to the problem. It contains clear information about problem or project, about the reasons for which the author deals with them). b) The core (the main part of text is divided into chapters, sections, paragraphs,	

subparagraphs etc. Each main section begins on a new page. What is important is the logical follow-up of chapters).
c) Conclusion (factual conclusions, own contribution or view summarizes the author at the end of paper. The conclusions indicate brief description of paper with the evaluation results and estimates of the importance of theory and practice. The conclusions shall follow the interpretation, reflections, descriptions and arguments in the core of the paper).
d) List of bibliographical references (alphabetically ordered by name, according to STN 690:2012).

Learning outcomes:
A graduate of the subject can/knows to:

Knowledge
- master cross-sectional knowledge and the requirements placed on the creation of a bachelor's thesis with a focus on application use,
- master the basic characteristics of pedagogical research and know pedagogical research methods,
- has broad knowledge and understanding of the structure of a bachelor's thesis, principles of text construction, formal and content aspects, ethics and citation techniques, etc.,
- know the evaluation criteria and defense of the bachelor's thesis.

Skills
- the ability to choose the right procedure when preparing a bachelor's thesis,
- to obtain information in the field in which the topic of the work is chosen and its use to solve the formulated scientific problem,
- solve practical problems that arise when solving a given problem,
- assess the information obtained, its significance in solving the established problem, with the relevant argumentation.

Competences
- to solve partial tasks in a complex solution of the chosen topic of the bachelor's thesis,
- readiness for further lifelong learning,
- obtain, sort, analyze and use the obtained information in solving the chosen problem with full moral responsibility and with respect for copyright,
- communicate professionally, present information and facts obtained and defend them in front of experts and laymen,
- to plan one's own scientific activity, to acquire new scientific knowledge for the expansion of knowledge and one's own professional growth.

Course content: General requirements for creating a bachelor's thesis. Assignment, structure and time schedule. Work with literature.
Theoretical starting points and basic concepts. Types of investigation of pedagogical phenomena. Basic methods of data collection and methods of quantitative and qualitative data processing in the bachelor's thesis.
Main principles and construction of the text. Structure, formal side and editing of work.
Abstract - types and scope of abstracts, practical advice on creating them.
Citation and list of bibliographic references in the work. Basic concepts – Quote, paraphrase, compilation, plagiarism. Evaluation and defense of the bachelor's thesis.
Basics of academic ethics and etiquette.

Recommended literature:

DARÁK, M., KRAJČOVÁ, N. (1995): Empirický výskum v pedagogike. ManaCon, Prešov.
JUNGER, J. (2000): Diplomová práca. Interný metodický materiál FHPV PU, FHPV, Prešov.
PASTERNÁKOVÁ, L. (2020): Výchovné a vzdělávácí metody ve světě edukace. Nová Forma, Týn nad Vltavou.
PASTERNÁKOVÁ, L. (2014): Inovácie na FHPV PU v Prešove. In: Univerzita v kontexte zmien. Vydavateľstvo Prešovskej univerzity, Prešov.
Smernica o náležitostiach záverečných prác, ich bibliografickej registrácii, kontrole originality, uchovávaní a sprístupňovaní [online]. PU, Prešov. Dostupné na: https://www.pulib.sk/web/kniznica/strana/nazov/zaverecne-prace
http://www.e-metodologia.fedu.uniba.sk/

Language which is necessary to complete the course: Slovak

Notes:

Course evaluation

Total number of students evaluated:

A	B	C	D	E	FX

Lecturers: Mgr. Mária Majherová, PhD.

Date of last change: 30. 10. 2024

Approved by: doc. Mgr. Ján Brajerčík, Ph.D.

COURSE DESCRIPTION

Name of the higher education institution: University of Presov	
Name of the faculty/university workplace: Faculty of Humanities and Natural Sciences	
Course code: 2MAT/PRST2	**Course title:** Probability and statistics 2
Type, scope and method of educational activity: Total hours: 90 Number of contact teaching hours: 16 • Lecture: 1 hour a week = 8 hours • Exercise: 1 hour a week = 8 hours Individual preparation for exercise: 50 hours Self-study and exam preparation: 24 hours Method of educational activity: combined	
Number of credits: 3	
Recommended semester: 6.	
Degree of study: 1.	
Prerequisites:	
Conditions for passing the course: The subject is finished with an exam. During the semester, the student prepares 1 assignment, which he submits on a pre-arranged date before the exam. During the exam period, a written examination (test) will be conducted, consisting of 2 areas (descriptive statistics, inductive statistics - comparison of sets and dependence of variables) and an oral examination - a discussion on the solution of the assignment. In total, the student can get 60 points (20 for the submitted assignment and discussion and 40 for the written exam). The final evaluation is given by the sum of points. A student is assessed with classification grade A if he obtains at least 90% of all points, B if he obtains at least 80% and less than 90% of all points, C if he obtains at least 70% and less than 80% of all points, D if he obtains at least 60% and less than 70% of all points, E if he obtains at least 50% and less than 60% of all points. If the student obtains less than 50% of all points or does not participate in classes without relevant reason for at least 3 weeks, he will be evaluated with the grade FX.	
Learning outcomes: A graduate of the subject can/knows to: Knowledge – define and explain basic concepts used in descriptive statistics, such as data distribution, mean value, variability, - define dependent and independent samples, dependent and independent variables, - explain the use of the selected statistical method, - interpret the results.	

Skills
- use statistical methods in various areas of processed data,
- work in statistical software,
- choose a suitable graphic presentation of the results,
- detect error data.

Competences
- give examples of research where which method is used,
- apply statistical methods in various areas of data processing,
- apply theoretical knowledge when solving tasks related to the content of the curriculum.

Course content: Descriptive statistics - measurement scales and their characteristics, normality of distribution, statistical characteristics of samples, inductive statistics - parameter estimates, statistical hypothesis testing, comparison of mean of dependent and independent samples (parametric tests; non-parametric tests) - possibilities of use and interpretation. ANOVA. Regression and correlation analysis. Dependence of qualitative variables – contingency tables, chi-square test. Use of computer techniques in statistical analyses.

Recommended literature:

BRAJERČÍK, J., MAJHEROVÁ, M., LITECKÁ, J. (2023): Matematika pre študentov prírodovedných odborov, 2. časť (Biológia – Ekológia – Fyzika – Geografia – Technika). Prešovská univerzita, Prešov.
HENDL, J. (2006): Přehled statistickych metod zpracování dat: analýza a metaanalýza dat. Portál, Praha.
HENDL, J. (2005): Kvalitativní výzkum : základní metody a aplikace. Portál, Praha.
MAGNELLO,E., VAN LOON, B. (2010): Statistika. Portal, Praha.
ŘEZANKOVÁ, H. (2011): Analýza dat z dotazníkových šetření. Professional publishing, Praha.

Language which is necessary to complete the course: Slovak

Notes:

Course evaluation
Total number of students evaluated:

A	B	C	D	E	FX

Lecturers: Mgr. Mária Majherová, PhD.

Date of last change: 30. 10. 2024

Approved by: doc. Mgr. Ján Brajerčík, Ph.D.

COURSE DESCRIPTION

Name of the higher education institution: University of Presov	
Name of the faculty/university workplace: Faculty of Humanities and Natural Sciences	
Course code: 2MAT/SMBP2	**Course title:** Bachelor's thesis seminar 2
Type, scope and method of educational activity: Total hours: 60 Number of contact teaching hours: 8 • Seminar: 1 hour a week = 8 hours Individual preparation for seminar: 52 hours Method of educational activity: combined	
Number of credits: 2	
Recommended semester: 6.	
Degree of study: 1.	
Prerequisites:	
Conditions for passing the course: The final assessment is passed. Consultations between the author of the bachelor's thesis and the supervisor (at least 5 consultations, others if necessary), before the actual implementation of the consultations, it is the student's duty to hand over the prepared parts of the bachelor's thesis to the supervisor in printed form or via email. If the student does not continuously consult the progress and results of his work with the supervisor, he will not be granted credits. At the end of the teaching part of the semester (the last week at the latest), the student submits a preliminary working version of the bachelor's thesis to the supervisor. At the supervisor's suggestion, the subject teacher will award credits to the student.	
Learning outcomes: A graduate of the subject can/knows to: Knowledge - master cross-sectional knowledge and the requirements for the review and defense of a bachelor's thesis with a focus on one's own output, argumentation, - master the specific criteria and requirements for the creation of a professional text with a logical and precise formulation of ideas, - have broad knowledge and understanding of the formal and content aspects of the individual basic parts of the work, - know and be able to check all the content requirements of a bachelor's thesis such as the abstract, introduction, conclusion and know their specifics from the content and formal side, - evaluate own research results, point out pitfalls when writing a thesis and can propose recommendations for practice.	

Skills
- be able to actively acquire, sort, analyze the information needed to solve the chosen problem,
- be able to use the facts obtained using relevant argumentation,
- process and submit the solved bachelor's thesis with all the criteria set for the given type of work,
- take full responsibility for the information that is given in the bachelor's thesis.

Competences
- obtain the corresponding facts independently,
- be able to interpret the facts correctly,
- be able to make responsible decisions on the use of information and facts with respect for copyright, based on rigorous analysis,
- act ethically and responsibly in obtaining and using the obtained information in solving the chosen problem with full moral responsibility,
- communicate and defend the information and facts obtained before experts and laymen,
- plan your own scientific activity, acquire new scientific knowledge to expand knowledge.

Course content: Analysis of the general requirements for the creation of the final thesis. Structure analysis a content and final thesis, analysis of the used literature. Analysis of the investigated pedagogical phenomena in the bachelor's thesis, used methods of data collection in the final theses, analysis of the used methods of quantitative and qualitative processing of results.

Recommended literature:

DARÁK, M., KRAJČOVÁ, N. (1995): Empirický výskum v pedagogike. ManaCon, Prešov.
JUNGER, J. (2000): Diplomová práca. Interný metodický materiál FHPV PU, FHPV, Prešov.
PASTERNÁKOVÁ, L. (2020): Výchovné a vzdělávácí metody ve světě edukace. Nová Forma, Týn nad Vltavou.
PASTERNÁKOVÁ, L. (2014): Inovácie na FHPV PU v Prešove. In: Univerzita v kontexte zmien. Vydavateľstvo Prešovskej univerzity, Prešov.
Smernica o náležitostiach záverečných prác, ich bibliografickej registrácii, kontrole originality, uchovávaní a sprístupňovaní [online]. PU, Prešov. Dostupné na: https://www.pulib.sk/web/kniznica/strana/nazov/zaverecne-prace
http://www.e-metodologia.fedu.uniba.sk/

Language which is necessary to complete the course: Slovak

Notes:

Course evaluation
Total number of students evaluated:

A	B	C	D	E	FX

Lecturers: Mgr. Mária Majherová, PhD.

Date of last change: 30. 10. 2024

Approved by: doc. Mgr. Ján Brajerčík, Ph.D.

COURSE DESCRIPTION

Name of the higher education institution: University of Presov	
Name of the faculty/university workplace: Faculty of Humanities and Natural Sciences	
Course code: 2MAT/ MATSS	**Course title:** Matematics
Type, scope and method of educational activity: Method of educational activity: attendance	
Number of credits: 2	
Recommended semester: 6.	
Degree of study: 1.	
Prerequisites:	
Conditions for passing the course: A student who has fulfilled the obligations set out in the study program can take the state exam in term determined by study schedule. The assessment based on the oral examination will be carried out according to the classification scale, which consists of six classification grades: A – excellent (excellent results: numerical value 1), B – very good (above average results: 1.5), C – good (average results: 2), D – satisfactory (acceptable results: 2.5), E – sufficient (the results meet the minimum criteria: 3), FX - insufficient (additional work required: 4). The main evaluation criteria are: depth of acquired knowledge, ability to apply acquired knowledge, independent and logical thinking supported by expressive skills.	
Learning outcomes: A graduate of the subject can/knows to: Knowledge - demonstrate knowledge of basic concepts and mathematical theorems from algebra and number theory, geometry, mathematical analysis, probability and mathematical statistics, - evaluate mutual relations and connections of different mathematical disciplines. Skills - argue correctly, assess the truth and falsity of statements, - give examples and counterexamples for given situations, - connect knowledge from different disciplines of mathematics. Competences - apply your own attitude and ability to self-reflect, - demonstrate language culture and the ability to orient himself in professional terminology.	
Course content: Algebra and number theory	

Elementary number theory, divisibility in the domain of integers, congruences. Mappings, relations, binary operations. Systems of linear equations over a field. Vector spaces. Linear mappings. Algebra of matrices. Algebraic structures with one and two binary operations. Polynomial ring. Polynomials of multiple indeterminates, symmetric polynomials. Algebraic equations.

Geometry
Affine spaces, their subspaces, analytical expression, mutual position of subspaces of an affine space. Dividing ratio, half-spaces. Convexity, angles. Euclidean spaces. Length, size, perpendicularity, distances in Euclidean spaces. Affine and similar mappings, isometries, their analytical expression and classification. Affine, equiform, Euclidean groups and their generators. Theorems on isometry and similarity of shapes.

Mathematical analysis
Numerical sets. Supremum and infimum. Sequences of real numbers. A function of one real variable. Limit and continuity of a function. Differential calculus of a function of one real variable. Indefinite integral. Definite integral. Improper integral. Infinite number series. Differential equations and their applications. Sequences and series of functions, their convergence.

Probability and mathematical statistics
Definitions of probability, conditional probability, absolute probability theorem, Bayes theorem, discrete and continuous random variable, numerical characteristics, descriptive statistics - description of samples using distribution and characteristics, inductive statistics - statistical hypothesis testing, comparison of mean values, dependence of numerical variables - regression and correlation analysis, dependence of nominal variables - contingency tables, chi-square test.

Recommended literature:

BERMAN, G., N. (1955): Zbierka úloh z matematickej analýzy. SNTL Bratislava.
BIRKHOFF, G. – Mac LANE, S. (1979): Prehľad modernej algebry. Alfa, Bratislava.
BRUCKNER, A.M., BRUCKNER J.B., THOMSON, B.S. (2008): Real Analysis, Second Edition, ClassicalRealAnalysis.com.
DUPLÁK, J. (2003): Afinné a Euklidovské priestory. FHPV PU, Prešov.
DUPLÁK, J. (2005): Zobrazenia a kužeľosečky. FHPV PU, Prešov.
ELIÁŠ, J., HORVÁTH, J., KAJAN, J., (ŠULKA, R.) (1966): Zbierka úloh z vyššej matematiky 1-(4). Alfa, Bratislava
HEJNÝ, M., a kol. (1983): Geometria I. SPN, Bratislava.
HENDL, J. (2006): Přehled statistickych metod zpracování dat: analýza a metaanalýza dat. Portál, Praha.
HENDL, J. (2005): Kvalitativní výzkum : základní metody a aplikace, Portál, Praha.
KATRIŇÁK, T. a kol. (1985): Algebra a teoretická aritmetika (1). Alfa, Bratislava.
KLUVÁNEK, I., MIŠÍK, L., ŠVEC, M. (1965): Matematika I, II. SVTL, Bratislava.
MIHALÍKOVÁ, B., OHRISKA, J. (1999): Matematická analýza 1. Prírodovedecká fakulta UPJŠ, Košice.
MIHALÍKOVÁ, B., OHRISKA, J. (2007): Matematická analýza 2. Prírodovedecká fakulta UPJŠ Košice.

NEUBRUNN, T., VENCKO, J. (1989): Matematická analýza 1, 2. MFF Univerzita Komenského, Bratislava.
RIEČAN, B., LAMOŠ, F. (1992): Pravdepodobnosť a matematická štatistika. Alfa, Bratislava.
SEKANINA, M., a kol. (1986): Geometria I. SPN, Praha.
SEKANINA, M., a kol. (1988): Geometria II. SPN, Praha.
SCHWARZ, Š.(1968): Základy náuky o riešení rovníc. SAV Bratislava.
ŠALÁT, T. a kol. (1986): Algebra a teoretická aritmetika (2). ALFA, SNTL Bratislava.
ŠEDIVÝ, O., a kol. (1987): Geometria II. SPN, Bratislava.
ZLATOŠ, P. (2011): Lineárna algebra a geometria. Bratislava.
ZNÁM, Š. (1977): Teória čísel. Alfa, Bratislava.

Language which is necessary to complete the course: Slovak

Notes:

Course evaluation
Total number of students evaluated:

A	B	C	D	E	FX

Lecturers: doc. Mgr. Ján Brajerčík, Ph.D.

Date of last change: 30.10.2024

Approved by: doc. Mgr. Ján Brajerčík, Ph.D.

COURSE DESCRIPTION

Name of the higher education institution: University of Presov	
Name of the faculty/university workplace: Faculty of Humanities and Natural Sciences	
Course code: 2MAT/OBHBP	**Course title:** Defense of bachelor's thesis
Type, scope and method of educational activity: Method of educational activity: attendance	
Number of credits: 10	
Recommended semester: 6.	
Degree of study: 1.	
Prerequisites:	

Conditions for passing the course:

- When preparing the bachelor thesis, the student follows the instructions of his supervisor and the Directive on the requirements of the final theses, their bibliographic registration, control of originality, storage and access issued by the University of Presov in Presov. The scope of work can be determined by the training workplace, while the recommended scope is 30 to 40 standard pages (54 000-72 000 characters) without appendices (from introduction to conclusion inclusive). The structure of the work and the formal arrangement of the work is determined, in agreement with the supervisor, by the Directive on the requirements of final theses. The final variant of the bachelor's thesis, bound in hardcover, will be submitted by the student to the department that listed the topic of the thesis. The deadline for submitting bachelor's theses is set in the schedule of the relevant academic year.
- The bachelor's thesis is submitted in two printed copies, its electronic version, which must be identical to the printed version, is inserted by the student into the final theses registration system in PDF format, no later than seven days after submitting the printed version. The originality of the work is assessed in the central register of theses. A report on the originality of the final thesis is drawn up on the result of the originality check. Checking originality is a necessary condition for defense. Based on the result of overlapping work with other works, the supervisor decides whether the work can be the subject of a defense.
- Part of the submission of the work is the conclusion of a license agreement on the use of a digital copy of the work between the author and the Slovak Republic on behalf of the university. After submitting the work to the EZP PU, the author immediately submits to the training workplace a draft license agreement signed by him, which must be signed by an authorized representative of the university (a senior employee of the training workplace) within 30 days of sending the work to the CRZP.
- The bachelor's thesis is assessed by the thesis supervisor and the opponent, who prepare assessments according to the established criteria.

The Commission for State Final Examinations will evaluate the progress of the defense in a closed session and decide on the classification. During the classification, it comprehensively assesses the quality of the work and its defense, considering the assessments and the progress

of the defense, and evaluates it with one common mark. The resulting evaluation may be the same as in the reviews, but it may also be better, or worse, depending on the progress of the defense. The decision on the result of the defense will be announced publicly by the chairman of the commission together with the result of the relevant state final exam.

Learning outcomes:
A graduate of the subject can/knows to:

Knowledge
- orient himself in the requirements, structure, concept of the final thesis and the method of its defense.

Skills
- independently and creatively use professional sources,
- analyse and evaluate the current state of the problem being solved,
- synthesize and apply acquired theoretical knowledge in the bachelor's thesis.

Competences
- present and defend his position in terms of the goal of the work and its contribution,
- demonstrate his language and professional culture and his own attitude towards the professional problems of his studies.

Course content:
The bachelor's thesis defense has a regular course:
1. Introduction of the author of the thesis, presentation of the results of the bachelor's thesis.
2. Presentation of the main points from the written assessments of the trainer and the opponent.
3. The student's answers to the questions of the instructor and the opponent.
4. Expert debate on the bachelor's thesis with questions for the student.

The bachelor's thesis is available to the committee during the defense. The introductory word should contain primarily the following points:
1. Brief justification of the choice of topic, its topicality, practical benefit.
2. Clarification of the goals and methods used in processing the work.
3. The main content problems of the work.
4. Conclusions and practical recommendations reached by the author of the work.
During the presentation, the student has at his disposal his own copy of the bachelor's thesis, or a written introductory presentation. He will deliver the speech separately. He can use computer technology. The introductory performance should be short, it should not exceed 10 minutes.

Recommended literature:
GAVORA, P. (1999): Úvod do pedagogického výskumu. Univerzita Komenského, Bratislava.
GONDA, V. (2012): Ako napísať a úspešne obhájiť diplomovú prácu. Iura Edition, Bratislava.
KATUŠČÁK, D. (1998): Ako písať vysokoškolské a kvalifikačné práce. Ako písať seminárne práce, ročníkové práce, práce ŠVOČ, diplomové práce, záverečné a atestačné práce a dizertácie. Stimul, Bratislava.
ŠVEC, Š. a kol. (1998): Metodológia vied o výchove. IRIS, Bratislava.

VIŠŇOVSKÝ, Ľ., ZOLYOMIOVÁ, P., BRINCKOVÁ, J. (2007): Metodika diplomovej práce. Univerzita Mateja Bela, Banská Bystrica.
Smernica o náležitostiach záverečných prác, ich bibliografickej registrácii, kontrole originality, uchovávaní a sprístupňovaní. [online]. PU v Prešove. Dostupné z: https://www.pulib.sk/web/kniznica/strana/nazov/zaverecne-prace

Language which is necessary to complete the course: Slovak

Notes:

Course evaluation
Total number of students evaluated:

A	B	C	D	E	FX

Lecturers: doc. Mgr. Ján Brajerčík, Ph.D.

Date of last change: 30.10.2024

Approved by: doc. Mgr. Ján Brajerčík, Ph.D.

COURSE DESCRIPTION

Name of the higher education institution: University of Presov	
Name of the faculty/university workplace: Faculty of Humanities and Natural Sciences	
Course code: 2MAT/KOMBI	**Course title:** Combinatorics

Type, scope and method of educational activity:
Total hours: 90
Number of contact teaching hours: 20

- Lecture: 1 hour a week = 10 hours
- Exercise: 1 hour a week = 10 hours

Individual preparation for exercise: 30 hours
Self-study: 40 hours
Method of educational activity: combined

Number of credits: 3

Recommended semester: 2./4.

Degree of study: 1.

Prerequisites:

Conditions for passing the course:
The subject is completed with an interim assessment. During the semester, the student prepares assignments, which he submits on a pre-agreed date. The student gets points for the tasks. The final evaluation is given by the sum of points. A student is assessed with classification grade
A if he obtains at least 90% of all points,
B if he obtains at least 80% and less than 90% of all points,
C if he obtains at least 70% and less than 80% of all points,
D if he obtains at least 60% and less than 70% of all points,
E if he obtains at least 50% and less than 60% of all points.
If the student obtains less than 50% of or does not participate in classes without relevant reason for at least 3 weeks, he will be evaluated with the grade FX.

Learning outcomes:
A graduate of the subject can/knows to:

Knowledge
- define individual terms and give examples,
- define the differences between variation, permutation and combination,
- calculate the number of permutations, variations, combinations according to formulas,
- write the coefficients of Pascal's triangle.

Skills
- apply concepts in practical tasks,
- list all variations, permutations and combinations according to the chosen system,

- find a suitable way of statement,
- detect missing variations, permutations and combinations.

Competences
- orient yourself in terminology, argue,
- apply theoretical knowledge when solving tasks related to the content of the curriculum.

Course content: Basic combinatorial principles, permutations, variations and combinations, binomial coefficients and Pascal's triangle, binomial theorem, combinatorial identities, principle of inclusion and exclusion. Dirichlet's principle.

Recommended literature:

KOSMÁK, L. (1979): Kombinatorická teória pravdepodobnosti. Alfa, Bratislava.
OLEJÁR, M. a kol. (2008): Kombinatorika. Young Scientist, Bratislava.
ZNÁM, Š. (1978): Kombinatorika a teória grafov. UK, Bratislava.
https://www.priklady.eu/sk/riesene-priklady-matematika/kombinatorika.alej

Language which is necessary to complete the course: Slovak

Notes:

Course evaluation
Total number of students evaluated:

A	B	C	D	E	FX

Lecturers: doc. RNDr. Sergej Iľkovič, PhD., Mgr. Mária Majherová, PhD.

Date of last change: 30. 10. 2024

Approved by: doc. Mgr. Ján Brajerčík, Ph.D.

COURSE DESCRIPTION

Name of the higher education institution: University of Presov	
Name of the faculty/university workplace: Faculty of Humanities and Natural Sciences	
Course code: 2MAT/UGEOM	**Course title:** Introduction to geometry

Type, scope and method of educational activity:
Total hours: 90
Number of contact teaching hours: 20

- Lecture: 1 hour a week = 10 hours
- Exercise: 1 hour a week = 10 hours

Individual preparation for exercise: 30 hours
Self-study and exam preparation: 40 hours
Method of educational activity: combined

Number of credits: 3

Recommended semester: 2. or 4.

Degree of study: 1.

Prerequisites:

Conditions for passing the course: The subject is finished with an interim assessment. During the semester, the student independently solves assigned tasks and presents their solutions in exercises. At the end of the semester, the student completes a written test on tasks corresponding to the content of the curriculum (50% of all points) and submits solutions of selected tasks (50% of all points). To successfully complete the subject, it is necessary to obtain at least 30% of the points intended for the written test and at least 30% of the points intended for solving the assigned tasks. The final evaluation is given by the sum of points. A student is assessed with classification grade
A if he obtains at least 90% of all points,
B if he obtains at least 80% and less than 90% of all points,
C if he obtains at least 70% and less than 80% of all points,
D if he obtains at least 60% and less than 70% of all points,
E if he obtains at least 50% and less than 60% of all points.
If the student obtains less than 50% of all points or less than 30% of the points intended for the written tests or less than 30% of the points intended for solving the assigned tasks, or does not participate in classes without relevant reason for at least 3 weeks, he will be evaluated with the grade FX.

Learning outcomes:
A graduate of the subject can/knows to:

Knowledge
- master the principle of GeoGebra software operation,
- define fundamental geometric concepts (point, line, plane, angle, triangle, polygon, circle),

- formulate statements about triangles, about the mutual relationship between angles, circles and a triangle,
- define the trigonometry of a triangle,
- classify isometric and similar mappings at the level of school mathematics,
- define the term vector and its use for mapping.

Skills
- control the basic tools of GeoGebra software,
- determine the unknown characteristics of the triangle based on the given data,
- construct the elevation, floor plan and side view of the given object (e.g. brick buildings),
- write the equations of a line and a plane in two-dimensional and three-dimensional space.

Competences
- apply theorems about triangles, circles, angles and their mutual relations when solving problems,
- assess isometry and similarity of shapes according to corresponding theorems,
- adopt the culture of mathematical expression,
- orient himself in terminology, argue, assess the truth and falsity of statements.

Course content: Point, line, plane. Angles, triangles and polygons. Circle and its parts. Central, peripheral and section angle. Significant elements of a triangle, inscribed and described circle. Theorems related to the triangle (Pythagorean and Euclid theorems, sine and cosine theorem). Trigonometry. Isometries and similar mappings. Vectors and translation. Analytical geometry in two-dimensional and three-dimensional space. 3D geometry - floor plan, elevation, side view, buildings made of blocks. GeoGebra.

Recommended literature:
BRAJERČÍK, J., DEMKO, M. (2018): Matematika pre študentov prírodovedných odborov (biológia - ekológia - geografia), 1. časť (elektronický dokument). PU v Prešove.
EUKLIDES (2022): Základy. Perfekt.
POLÁK, J. (2008): Přehled středoškolské matematiky. PROMETHEUS, Praha.
POLÁK, J. (1999): Středoškolská matematika v úlohách II. PROMETHEUS, Praha.
Mathematics textbooks for basic and secondary schools containing relevant curriculum.
www.geogebra.com

Language which is necessary to complete the course: Slovak

Notes:

Course evaluation
Total number of students evaluated:

A	B	C	D	E	FX

Lecturers: doc. Mgr. Ján Brajerčík, Ph.D., doc. RNDr. Sergej Iľkovič, Ph.D., Mgr. Mária Majherová, PhD.

Date of last change: 30.10.2024

Approved by: doc. Mgr. Ján Brajerčík, Ph.D.

COURSE DESCRIPTION

Name of the higher education institution: University of Presov	
Name of the faculty/university workplace: Faculty of Humanities and Natural Sciences	
Course code: 2MAT/FYZMA	**Course title:** Physics for mathematicians
Type, scope and method of educational activity: Total hours: 90 Number of contact teaching hours: 20 • Lecture: 2 hours a week = 10 hours • Exercise: 1 hour a week = 10 hours Individual preparation for exercise: 30 hours Self-study and exam preparation: 40 hours Method of educational activity: combined	
Number of credits: 3	
Recommended semester: 3. or 5.	
Degree of study: 1.	
Prerequisites:	
Conditions for passing the course: The subject is finished with an interim assessment. During the semester, the student independently solves assigned tasks, presents their solutions in exercises. At the end of the semester, the student completes a written test on tasks corresponding to the content of the curriculum (50% of all points) and submits solutions of selected tasks (50% of all points). To successfully complete the subject, it is necessary to obtain at least 30% of the points intended for the written test and at least 30% of the points intended for solving the assigned tasks. The final evaluation is given by the sum of points. A student is assessed with classification grade A if he obtains at least 90% of all points, B if he obtains at least 80% and less than 90% of all points, C if he obtains at least 70% and less than 80% of all points, D if he obtains at least 60% and less than 70% of all points, E if he obtains at least 50% and less than 60% of all points. If the student obtains less than 50% of all points or less than 30% of the points intended for the written tests or less than 30% of the points intended for solving the assigned tasks, or does not participate in classes without relevant reason for at least 3 weeks, he will be evaluated with the grade FX.	
Learning outcomes: A graduate of the subject can/knows to: Knowledge - define physical concepts, physical quantities and physical units related to the content of the curriculum, - classify the basic areas of physics and define their subject,	

- formulate physical laws related to the content of the curriculum and present their meaning.

Skills
- use a suitable mathematical apparatus to solve physical problems,
- solve selected tasks and present the result of their solution with an emphasis on physical meaning,
- identify the appropriate method of solving the given task.

Competences
- identify mathematical objects in physical content,
- evaluate the contribution of selected personalities from history to physics and mathematics,
- orient himself in physical terminology, argue, assess the truth and falsity of statements.

Course content: Selected chapters from the following areas of physics: mechanics of a point mass, mechanics of liquids and gases, thermodynamics, electricity and magnetism, oscillations and waves, atomic and nuclear physics.

Recommended literature:
HAJKO, V., a kol. (1985): Fyzika v príkladoch. SNTL, Bratislava.
HAJKO, V., DANIEL-SZABÓ, J. (1974): Základy fyziky. Veda, Bratislava.
HANZELIK, F., a kol. (1989): Zbierka riešených úloh z fyziky. Alfa, Bratislava.
KREMPASKÝ, J. (1982): Fyzika. SNTL, Bratislava.
KREMPASKÝ, J., a kol. (1995): Fyzika. Príklady a úlohy. STU, Bratislava.
Textbooks of physics for grammar schools.

Language which is necessary to complete the course: Slovak

Notes:

Course evaluation
Total number of students evaluated:

A	B	C	D	E	FX

Lecturers: doc. RNDr. Sergej Iľkovič, PhD., doc. Mgr. Ján Brajerčík, Ph.D.

Date of last change: 30.10.2024

Approved by: doc. Mgr. Ján Brajerčík, Ph.D.

COURSE DESCRIPTION

Name of the higher education institution: University of Presov	
Name of the faculty/university workplace: Faculty of Humanities and Natural Sciences	
Course code: 2MAT/ZPROG	**Course title:** Basics of programming

Type, scope and method of educational activity:
Total hours: 90
Number of contact teaching hours: 20

- Lecture: 1 hour a week = 10 hours
- Exercise: 1 hour a week = 10 hours

Individual preparation for exercise: 30 hours
Self-study: 40 hours
Method of educational activity: combined

Number of credits: 3

Recommended semester: 3./5.

Degree of study: 1.

Prerequisites:

Conditions for passing the course:
The subject is completed with an interim assessment. During the semester, the student prepares a project, which he submits on a pre-agreed date. The student gets points for the project. A student is assessed with classification grade
A if he obtains at least 90% of all points,
B if he obtains at least 80% and less than 90% of all points,
C if he obtains at least 70% and less than 80% of all points,
D if he obtains at least 60% and less than 70% of all points,
E if he obtains at least 50% and less than 60% of all points.
If the student obtains less than 50% or does not participate in classes without relevant reason for at least 3 weeks, he will be evaluated with the grade FX.

Learning outcomes:
A graduate of the subject can/knows to:

Knowledge
- define variable types,
- describe the basic features of the algorithm and give examples,
- describe basic commands in the programming language,
- propose an algorithm for solving the problem.

Skills
- create a solution diagram,
- create a simple program from the designed algorithm,
- detect and "debug" errors in the program,

- use standard and user libraries.

Competences
- correct errors in a foreign program,
- add additional commands to the program based on the request.

Course content: History of programming languages. Types of programming languages. Environment in Python programming language. Algorithm. Types of variables. Program branching. Cycles with a finite number of repetitions. Cycles with the number of repetitions based on the evaluation of the condition. Use of standard and user libraries.

Recommended literature:

Blaho, A. (2018): Programovanie v Pythone. UK, Bratislava.
https://python.input.sk/z/01.html
https://www.viemeinformatiku.sk/cvicenia-programovanie-v-pythone

Language which is necessary to complete the course: Slovak

Notes:

Course evaluation

Total number of students evaluated:

A	B	C	D	E	FX

Lecturers: Mgr. Mária Majherová, PhD., doc. RNDr. Sergej Iľkovič, PhD., prof. Oksana Mulesa, Dr.Sc.

Date of last change: 30. 10. 2024

Approved by: doc. Mgr. Ján Brajerčík, Ph.D.

COURSE DESCRIPTION

Name of the higher education institution: University of Presov	
Name of the faculty/university workplace: Faculty of Humanities and Natural Sciences	
Course code: 2MAT/TOPOL	**Course title:** Introduction to topology

Type, scope and method of educational activity:
Total hours: 90
Number of contact teaching hours: 20

- Lecture: 1 hour a week = 10 hours
- Exercise: 1 hour a week = 10 hours

Individual preparation for exercise: 30 hours
Self-study and exam preparation: 40 hours
Method of educational activity: combined

Number of credits: 3

Recommended semester: 4.

Degree of study: 1.

Prerequisites:

Conditions for passing the course: The subject is finished with an interim assessment. During the semester, the student independently solves assigned tasks and presents their solutions in exercises. At the end of the semester, the student completes a written test on tasks corresponding to the content of the curriculum (50% of all points) and submits solutions of selected tasks (50% of all points). To successfully complete the subject, it is necessary to obtain at least 30% of the points intended for the written test and at least 30% of the points intended for solving the assigned tasks. The final evaluation is given by the sum of points. A student is assessed with classification grade
A if he obtains at least 90% of all points,
B if he obtains at least 80% and less than 90% of all points,
C if he obtains at least 70% and less than 80% of all points,
D if he obtains at least 60% and less than 70% of all points,
E if he obtains at least 50% and less than 60% of all points.
If the student obtains less than 50% of all points or less than 30% of the points intended for the written tests or less than 30% of the points intended for solving the assigned tasks, or does not participate in classes without relevant reason for at least 3 weeks, he will be evaluated with the grade FX.

Learning outcomes:
A graduate of the subject can/knows to:

Knowledge
- define basic concepts of topology (topology, topological space, open and closed set, basis of topology, system of topology generators, continuity of mapping, subspace of topological space, metric space, product of topological spaces),

- formulate statements regarding the content of the curriculum and provide their proofs.

Skills
- verify the validity of topology axioms for the system of subsets of a given set,
- determine the properties of topological spaces,
- introduce different topologies on a given set and compare them,
- find out whether the system of subsets of the given set represents a basis or a system of generators of a given topology.

Competences
- give examples of topological spaces and their representations with the required properties,
- apply theoretical knowledge when solving tasks related to the content of the curriculum,
- orient himself in terminology, argue, assess the truth and falsity of statements.

Course content: Topological spaces, continuous mappings and homeomorphisms, subspaces and products of topological spaces, factor spaces, metric spaces, properties of topological spaces (Hausdorff, normal, regular, paracompact, continuous, compact).

Recommended literature:

BURBAKI, N. (1959): Obščaja topologija. Gos. izd. fizikomatematičeskoj literatury, Moskva.
HEJNÝ, M., KULICH, I., TVAROŽEK, J. (1983): Čo je topológia? Alfa, Bratislava.
KELLEY, J. L. (1955): General topology. D. Van Nostrand Company, INC., New York.
KRUPKA, D., KRUPKOVÁ, O. (1989): Topologie a geometrie 1, Obecní topologie. SPN Praha.

Language which is necessary to complete the course: Slovak

Notes:

Course evaluation

Total number of students evaluated:

A	B	C	D	E	FX

Lecturers: doc. Mgr. Ján Brajerčík, Ph.D.

Date of last change: 30.10.2024

Approved by: doc. Mgr. Ján Brajerčík, Ph.D.

COURSE DESCRIPTION

Name of the higher education institution: University of Presov	
Name of the faculty/university workplace: Faculty of Humanities and Natural Sciences	
Course code: 2MAT/KADIS	**Course title:** Chapters from discrete mathematics

Type, scope and method of educational activity:
Total hours: 90
Number of contact teaching hours: 20

- Lecture: 1 hour a week = 10 hours
- Exercise: 1 hour a week = 10 hours

Individual preparation for exercise: 30 hours
Self-study and exam preparation: 40 hours
Method of educational activity: combined

Number of credits: 3

Recommended semester: 5.

Degree of study: 1.

Prerequisites:

Conditions for passing the course: The subject is finished with an interim assessment. During the semester, the student independently solves assigned tasks, presents their solutions in exercises. At the end of the semester, the student completes a written test on tasks corresponding to the content of the curriculum (50% of all points) and submits solutions of selected tasks (50% of all points). To successfully complete the subject, it is necessary to obtain at least 30% of the points intended for the written test and at least 30% of the points intended for solving the assigned tasks. The final evaluation is given by the sum of points. A student is assessed with classification grade
A if he obtains at least 90% of all points,
B if he obtains at least 80% and less than 90% of all points,
C if he obtains at least 70% and less than 80% of all points,
D if he obtains at least 60% and less than 70% of all points,
E if he obtains at least 50% and less than 60% of all points.
If the student obtains less than 50% of all points or less than 30% of the points intended for the written tests or less than 30% of the points intended for solving the assigned tasks, or does not participate in classes without relevant reason for at least 3 weeks, he will be evaluated with the grade FX.

Learning outcomes:
A graduate of the subject can/knows to:

Knowledge
- define the basic concepts of graph theory,
- know the meaning of terms and symbols in the definitions,
- classify special classes of graphs,

- formulate basic statements of graph theory.

Skills
- perform graph operations, represent relations on graphs,
- solve basic types of tasks, choose a suitable solution method,
- verify the validity of assertions,
- present his thoughts graphically and symbolically.

Competences
- master the notation of basic mathematical concepts,
- adopt the culture of mathematical expression,
- illustrate definitions with suitable examples,
- orient himself in terminology, argue, assess the truth and falsity of statements, give examples and counterexamples.

Course content: Relationships on graphs, operations with graphs, paths in graphs, special classes of graphs. Connectivity and distance in graphs. Trees, skeletons. Planarity. Polyhedra. Independence and covering. Graph colorings (vertex coloring, chromatic polynomial, edge coloring). Oriented graphs.

Recommended literature:
JENDROĽ, S., MIHÓK, P. (1992): Diskrétna matematika I, UPJŠ Košice.
KNOR, M. (2000): Kombinatorika a teória grafov I, UK Bratislava.
MATOUŠEK, J., NEŠETŘIL J. (2000): Kapitoly z diskrétní matematiky, Karolinum, Praha.

Language which is necessary to complete the course: Slovak

Notes:

Course evaluation
Total number of students evaluated:

A	B	C	D	E	FX

Lecturers: Prof. Oksana Mulesa, Dr.Sc.

Date of last change: 30.10.2024

Approved by: doc. Mgr. Ján Brajerčík, Ph.D.

COURSE DESCRIPTION

Name of the higher education institution: University of Presov	
Name of the faculty/university workplace: Faculty of Humanities and Natural Sciences	
Course code: 2MAT/APLSM	**Course title:** Applications of statistical methods in research
Type, scope and method of educational activity: Total hours: 60 Number of contact teaching hours: 8 • Exercise: 1 hour a week = 8 hours Individual preparation for exercise: 16 hours Self-study: 36 hours Method of educational activity: combined	
Number of credits: 2	
Recommended semester: 6.	
Degree of study: 1.	
Prerequisites:	
Conditions for passing the course: The subject is completed with an interim assessment. During the semester, the student prepares an assignment, which he defends in front of the students on a pre-arranged date. The assignment is prepared in the form of a semester paper. The final evaluation is given by points. A student is assessed with classification grade A if he obtains at least 90% of all points, B if he obtains at least 80% and less than 90% of all points, C if he obtains at least 70% and less than 80% of all points, D if he obtains at least 60% and less than 70% of all points, E if he obtains at least 50% and less than 60% of all points. If the student obtains less than 50% of all points or does not participate in classes without relevant reason for at least 3 weeks, he will be evaluated with the grade FX.	
Learning outcomes: A graduate of the subject can/knows to: Knowledge - define and explain the basic concepts that will be used during processing, - define variables according to the measurement scale, - describe the samples in the assigned task. Skills - process data in statistical software, - choose a suitable graphic presentation of the results depending on their type, - detect error data.	

Competences
- interpret and generalize the results,
- give examples to explain the terminology,
- apply statistical methods in various areas,
- apply theoretical knowledge when solving tasks related to the content of the curriculum.

Course content: Presentation in statistics - tables and graphs, forms of data collection, data generation, questionnaire - creating a questionnaire, types of questions, data processing in questionnaires, properties - validity and reliability, hypothesis testing, practical demonstrations and working with data from the field of biology, medical sciences, ecology, sociology, pedagogy, psychology, physical education and sport.

Recommended literature:

HENDL, J. (2008): Kvalitatívny výskum : základní teorie, metody a aplikace. Portál, Praha.
HENDL, J. (2006): Přehled statistickych metod zpracování dat: analýza a metaanalýza dat. Portál, Praha.
PEKÁR, S. ,BRABEC, M. (2009): Moderní analýza biologických dát. Scientia, Praha.
SKUTIL, M. a kol. (2011): Základy pedagogicko-psychologického výzkumu pro studenty učitelství. Portál, Praha.
ŠVAŘÍČEK, R., ŠEĎOVÁ, K. (2007): Kvalitativní výzkum v pedagogických vědách. Portál, Praha.

Language which is necessary to complete the course: Slovak

Notes:

Course evaluation

Total number of students evaluated:

A	B	C	D	E	FX

Lecturers: Mgr. Mária Majherová, PhD.

Date of last change: 30. 10. 2024

Approved by: doc. Mgr. Ján Brajerčík, Ph.D.

COURSE DESCRIPTION

Name of the higher education institution: University of Presov	
Name of the faculty/university workplace: Faculty of Humanities and Natural Sciences	
Course code: 2MAT/VKGEO	**Course title:** Selected chapters from geometry

Type, scope and method of educational activity:
Total hours: 60
Number of contact teaching hours: 8

- Seminar: 1 hour a week = 8 hours

Individual preparation for exercise: 22 hours
Self-study and exam preparation: 30 hours
Method of educational activity: combined

Number of credits: 2

Recommended semester: 6.

Degree of study: 1.

Prerequisites:

Conditions for passing the course: The subject is finished with an interim assessment. During the semester, the student independently solves assigned tasks and presents their solutions in exercises. At the end of the semester, the student completes a written test on tasks corresponding to the content of the curriculum (50% of all points) and submits solutions of selected tasks (50% of all points). To successfully complete the subject, it is necessary to obtain at least 30% of the points intended for the written test and at least 30% of the points intended for solving the assigned tasks. The final evaluation is given by the sum of points. A student is assessed with classification grade
A if he obtains at least 90% of all points,
B if he obtains at least 80% and less than 90% of all points,
C if he obtains at least 70% and less than 80% of all points,
D if he obtains at least 60% and less than 70% of all points,
E if he obtains at least 50% and less than 60% of all points.
If the student obtains less than 50% of all points or less than 30% of the points intended for the written tests or less than 30% of the points intended for solving the assigned tasks, or does not participate in classes without relevant reason for at least 3 weeks, he will be evaluated with the grade FX.

Learning outcomes:
A graduate of the subject can/knows to:

Knowledge
- define and explain the individual phases of the tasks of constructive geometry,
- formulate basic Euclidean constructions and justify them,
- define selected Apollonius tasks,
- define the power of a point with respect to a circle and circle inversion.

Skills
- control the basic tools of the GeoGebra software,
- implement basic Euclidean constructions,
- solve selected Apollonius tasks,
- apply GeoGebra software to solve tasks of constructive geometry.

Competences
- apply affine mapping when solving tasks of constructive geometry,
- justify the correctness of the implemented construction,
- adopt the culture of expression in the field constructive geometry,
- orient himself in terminology, argue, assess the truth and falsity of statements.

Course content: Constructive tasks in school mathematics. Euclidean constructions. Some tasks of Apollonius. Circle inversion. Power of a point with respect to a circle. The use of affine mappings in solving tasks of constructive geometry. Using of GeoGebra software to solve tasks of constructive geometry.

Recommended literature:

DUPLÁK, J. (2005): Zobrazenia a kužeľosečky. FHPV PU, Prešov.
EUKLIDES (2022): Základy. Perfekt.
CHALMOVIANSKY, P. (2010): Geometria afinných zobrazení euklidovských priestorov. UK Bratislava.
IĽAŠ, Š., DUPLÁK, J. (1970): Geometria – riešené úlohy. SPN Bratislava.
Mathematics textbooks for basic and secondary schools containing relevant curriculum.
www.geogebra.com

Language which is necessary to complete the course: Slovak

Notes:

Course evaluation

Total number of students evaluated:

A	B	C	D	E	FX

Lecturers: doc. Mgr. Ján Brajerčík, Ph.D.

Date of last change: 30.10.2024

Approved by: doc. Mgr. Ján Brajerčík, Ph.D.

COURSE DESCRIPTION

Name of the higher education institution: University of Presov	
Name of the faculty/university workplace: Faculty of Humanities and Natural Sciences	
Course code: 2MAT/LATEX	**Course title:** Document preparation system LaTeX

Type, scope and method of educational activity:
Total hours: 60
Number of contact teaching hours: 10

- Seminar: 1 hour a week = 10 hours

Individual preparation for exercise: 30 hours
Self-study and exam preparation: 20 hours
Method of educational activity: combined

Number of credits: 2

Recommended semester: 2. or 4.

Degree of study: 1.

Prerequisites:

Conditions for passing the course: The subject is finished with an interim assessment. During the semester, the student independently solves assigned tasks. At the end of the semester, the student completes a test on tasks corresponding to the content of the curriculum (50% of all points) and submits solutions of selected tasks (50% of all points). To successfully complete the subject, it is necessary to obtain at least 30% of the points intended for the test and at least 30% of the points intended for solving the assigned tasks. The final evaluation is given by the sum of points. A student is assessed with classification grade
A if he obtains at least 90% of all points,
B if he obtains at least 80% and less than 90% of all points,
C if he obtains at least 70% and less than 80% of all points,
D if he obtains at least 60% and less than 70% of all points,
E if he obtains at least 50% and less than 60% of all points.
If the student obtains less than 50% of all points or less than 30% of the points intended for the tests or less than 30% of the points intended for solving the assigned tasks, or does not participate in classes without relevant reason for at least 3 weeks, he will be evaluated with the grade FX.

Learning outcomes:
A graduate of the subject can/knows to:

Knowledge
- understand the operating principles of the TeX typography system,
- use relevant programs (e.g. MikTeX, TeXmaker) to translate and edit documents,
- classify LaTeX system classes, necessary packages and their use,
- describe the possibilities of individual system environments.

Skills
- master the basics of text typesetting in the document preparation system LaTeX,
- set font attributes, document page format,
- use different environments of the LaTeX system,
- create a simple table and picture,
- divide the document into parts, create content, use cross-references,
- use the mathematical environment to type formulas and schemes,
- create a simple electronic presentation in the LaTeX system.

Competences
- modify the system settings to achieve the desired output,
- orient in terminology, in similar text typesetting systems, compare typesetting options.

Course content: TeX and LaTeX system functioning. About MikTeX and TeXmaker programs. Preparation of source document. Special characters. Basic commands. Document type, spaces, paragraphs, styles, line breaks, pages. Page format, breakdown, environment. Creation of figures and tables. Typesetting of formulas and schemes (symbols, equations, matrices, mathematical text). Cross-references (content, formulas, citations, references). Electronic presentation of texts.

Recommended literature:

JASENSKÁ, H., ŠVEDOVÁ, A. (1996): LaTeX, úvodná príručka. VS SAV, Bratislava.
LAMPORT, L. (1986): LaTeX - A Document Preparation System. Addison - Wesley Pub. Company.
OLŠÁK, P. (2001): TeXbook naruby. Konvoj, CSTUG, Brno.
RYBIČKA, J. (2003): LaTeX pro začátečníky. KONVOJ, Brno.
http://www.cstug.cz/

Language which is necessary to complete the course: Slovak

Notes:

Course evaluation
Total number of students evaluated:

A	B	C	D	E	FX

Lecturers: doc. Mgr. Ján Brajerčík, Ph.D.

Date of last change: 30.10.2024

Approved by: doc. Mgr. Ján Brajerčík, Ph.D.

COURSE DESCRIPTION

Name of the higher education institution: University of Presov	
Name of the faculty/university workplace: Faculty of Humanities and Natural Sciences	
Course code: 2MAT/UPRAV	**Course title:** Probability exercises

Type, scope and method of educational activity:
Total hours: 60
Number of contact teaching hours: 10

- Exercise: 1 hour a week = 10 hours

Individual preparation for exercise: 10 hours
Self-study: 40 hours
Method of educational activity: combined

Number of credits: 2

Recommended semester: 4.

Degree of study: 1.

Prerequisites:

Conditions for passing the course:
The subject is completed with an interim assessment. During the semester, the student processes the assignments, which he submits on a pre-agreed date. The final evaluation is given by the sum of the points for the assignments. A student is assessed with classification grade
A if he obtains at least 90% of all points,
B if he obtains at least 80% and less than 90% of all points,
C if he obtains at least 70% and less than 80% of all points,
D if he obtains at least 60% and less than 70% of all points,
E if he obtains at least 50% and less than 60% of all points.
If the student obtains less than 50% of all points or does not participate in classes without relevant reason for at least 3 weeks, he will be evaluated with the grade FX.

Learning outcomes:
A graduate of the subject can/knows to:

Knowledge
- define and explain the basic concepts that will be used in the solution,
- define classical, geometric and conditional probability,
- calculate probabilities according to the presented formulas.

Skills
- create tasks for calculating probability in games,
- compare the probabilities of different events.

Competences
- solve practical tasks,
- apply theoretical knowledge when solving tasks related to the content of the curriculum.

Course content: Description of events, definition of classical probability, problem solving - selection from games - cube, cards, roulette, simulations of random events using a random number generator.

Recommended literature:

HEBÁK, P., KAHOUNOVÁ, J. (1988): Počet pravděpodobnosti v příkladech. SNTL, Praha.
RIEČAN, B., LAMOŠ, F. (1992): Pravdepodobnosť a matematická štatistika. Alfa, Bratislava.

Language which is necessary to complete the course: Slovak

Notes:

Course evaluation

Total number of students evaluated:

A	B	C	D	E	FX

Lecturers: Mgr. Mária Majherová, PhD.

Date of last change: 30. 10. 2024

Approved by: doc. Mgr. Ján Brajerčík, Ph.D.

COURSE DESCRIPTION

Name of the higher education institution: University of Presov	
Name of the faculty/university workplace: Faculty of Humanities and Natural Sciences	
Course code: 2MAT/INZDR	**Course title:** Information sources in natural science subjects
Type, scope and method of educational activity: Total hours: 60 Number of contact teaching hours: 10 • Exercise: 1 hour a week = 10 hours Individual preparation for exercise: 10 hours Self-study: 40 hours Method of educational activity: combined	
Number of credits: 2	
Recommended semester: 4.	
Degree of study: 1.	
Prerequisites:	
Conditions for passing the course: The subject is completed with an interim assessment. During the semester, the student processes the assignments, which he submits on a pre-agreed date. The final evaluation is given by the sum of the points for the assignments. A student is assessed with classification grade A if he obtains at least 90% of all points, B if he obtains at least 80% and less than 90% of all points, C if he obtains at least 70% and less than 80% of all points, D if he obtains at least 60% and less than 70% of all points, E if he obtains at least 50% and less than 60% of all points. If the student obtains less than 50% of all points or does not participate in classes without relevant reason for at least 3 weeks, he will be evaluated with the grade FX.	
Learning outcomes: A graduate of the subject can/knows to: Knowledge - define areas in education where the Internet will be used, - select the relevant information on the website. Skills - interpret the content of the www page with the selection of important information, - search for Internet resources on a specified topic. Competences - guide when choosing internet resources,	

- apply theoretical knowledge when solving tasks related to the content of the curriculum.

Course content: Searching for websites according to the specified topic, presentation of found websites, selection of the most suitable websites, creation of a simple website, linking of websites in a word document, multimedia and computer learning programs.

Recommended literature:
www.planetavedomosti.sk,
www.ucmesa.sk
www.zborovna.sk
Internet sources

Language which is necessary to complete the course: Slovak

Notes:

Course evaluation
Total number of students evaluated:

A	B	C	D	E	FX

Lecturers: Mgr. Mária Majherová, PhD.

Date of last change: 30. 10. 2024

Approved by: doc. Mgr. Ján Brajerčík, Ph.D.