Course descriptions

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COURSE DESCRIPTION

Academic year: 2025/2026

University: Comenius University Bratislava

Faculty: Faculty of Mathematics, Physics and Informatics

Course ID:	**Course title:**
FMFI.KAG/1-MAT-220/00	Algebra (1)

Educational activities:
Type of activities: lecture / practicals
Number of hours:
per week: 2 / 1 **per level/semester:** 26 / 13
Form of the course: on-site learning

Number of credits: 4

Recommended semester: 3.

Educational level: I.

Prerequisites: FMFI.KAG/1-MAT-120/15 - Linear Algebra and Geometry (1)

Recommended prerequisites:
1-MAT-160 Linar algebra and geometry (2)

Course requirements:
Ongoing evaluation: homeworks and test
Exam: combined
Indicative evaluation scale: A 90%, B 80%, C 70%, D 60%, E 50%
Scale of assessment (preliminary/final): 30/70

Learning outcomes:
Mastering the basic concepts and methods in the area of group theory, and the ability to actively use them to solve theoretical problems.

Class syllabus:
Semigroups and monoids. Definition and examples of groups. Subgroups and subgroups generated by a set.
Cyclic groups. Invariant subgroups and factor groups. Homomorphisms and congruence relations of groups. Theorem of Lagrange. Permutations groups. Direct product of groups.
Rings, integral domains and fields (definitions and examples). Subrings and ideals. Ideals and differential rings.
Homomorphisms and congruence relations of rings. Field of fractions of a commutative integral domain.

Recommended literature:
T. Katriňák a kol.: Algebra and theoretical arithmetics 1, Univerzita Komenského, 1999 (slovak)
G. Birkhoff, S. Mac Lane, Survey of modern algebra, Bratislava, Alfa 1979 (slovak transl.)

Languages necessary to complete the course:
slovak, english

Notes:

Past grade distribution
Total number of evaluated students: 339

A	B	C	D	E	FX
15,63	5,01	13,27	12,09	44,84	9,14

Lecturers: doc. RNDr. Martin Mačaj, PhD.

Last change: 14.03.2022

Approved by: prof. RNDr. Ján Filo, CSc.

COURSE DESCRIPTION

Academic year: 2025/2026

University: Comenius University Bratislava

Faculty: Faculty of Mathematics, Physics and Informatics

Course ID:	**Course title:**
FMFI.KAG/1-MAT-260/00	Algebra (2)

Educational activities:
Type of activities: lecture / practicals
Number of hours:
per week: 2 / 1 **per level/semester:** 26 / 13
Form of the course: on-site learning

Number of credits: 4

Recommended semester: 4.

Educational level: I.

Prerequisites: FMFI.KAG/1-MAT-220/00 - Algebra (1)

Course requirements:
Ongoing evaluation: homeworks and test
Exam: combined
Indicative evaluation scale: A 90%, B 80%, C 70%, D 60%, E 50%
Scale of assessment (preliminary/final): 30/70

Learning outcomes:
Mastering the basic concepts and methods in the area of group theory, and the ability to actively use them to solve theoretical problems.

Class syllabus:
Polynomial rings. Ring of functions. Polynomials in several elements. Structure of polynomial rings: greatest common divisors, factorization theory. Roots of a polynomial in a field, factorization of a polynomial using roots. Simple algebraic extension of a field. Solutions of some special algebraic equations.

Recommended literature:
T. Katriňák a kol.:Algebra and theoretical arithmetics 1, Univerzita Komenského, 1999 (Slovak)
G. Birkhoff, S. Mac Lane: Survey of modern algebra, Bratislava, Alfa 1979 (Slovak transl.)

Languages necessary to complete the course:
slovak,english

Notes:

Past grade distribution
Total number of evaluated students: 307

A	B	C	D	E	FX
18,24	5,86	12,7	19,87	35,5	7,82

Lecturers: doc. RNDr. Martin Mačaj, PhD.

Last change: 14.03.2022

Approved by: prof. RNDr. Ján Filo, CSc.

COURSE DESCRIPTION

Academic year: 2025/2026

University: Comenius University Bratislava

Faculty: Faculty of Mathematics, Physics and Informatics

Course ID:	**Course title:**
FMFI.KAG/1-MAT-456/22	Algebra (3)

Educational activities:
Type of activities: lecture
Number of hours:
per week: 2 **per level/semester:** 26
Form of the course: on-site learning

Number of credits: 3

Recommended semester: 5.

Educational level: I.

Prerequisites:

Recommended prerequisites:
FMFI.KAG/1-MAT-220/00 Algebra (2)

Course requirements:
Final exam constiting of answers to theoretical questions and solution of an exercise (a proof)
A - 91%+
B - 81%-90%
C - 71%-80%
D - 61%-70%
E - 50%-60%
Fx - less than 50%

Learning outcomes:
Students will master the basic methods and results of module theory. They will also know and be able to use some important algorithms in the field of group theory and spectral theory of matrices, which are important, for example, for solving linear differential equations.

Class syllabus:
The matrices over the Euclidean rings and the rings of principal ideals (RPI), Smith's canonical form of the matrix. Modules, free modules, finally generated modules over RPI - theorem on decomposition of finitelly generated modules over OHI. Characterization of finite commutative groups. Application of the decomposition theorem to the similarity of matrices, Jordan's canonical form of a matrix. Caley-Hamilton theorem. Complex scalar product, Hermitian, skew Hermitian, unitary and normal matrices. Schur's theorem. Unitary similarity for normal matrices, orthogonal similarity for real symmetric, skew symmetric and orthogonal matrices.

Recommended literature:
Algebra II : Chapters 4-7 / Nicolas Bourbaki ; translated by P. M. Cohn, J. Howie. Berlin : Springer, 2003
Teachers electronic text, manuscript

Languages necessary to complete the course:

slovak, english

Notes:

Past grade distribution
Total number of evaluated students: 7

A	B	C	D	E	FX
57,14	28,57	0,0	14,29	0,0	0,0

Lecturers: doc. RNDr. Jaroslav Guričan, CSc.

Last change: 21.06.2022

Approved by: prof. RNDr. Ján Filo, CSc.

COURSE DESCRIPTION

Academic year: 2025/2026

University: Comenius University Bratislava

Faculty: Faculty of Mathematics, Physics and Informatics

Course ID:	**Course title:**
FMFI.KAG/1-MAT-457/22	Algebra (4)

Educational activities:
Type of activities: lecture
Number of hours:
per week: 2 **per level/semester:** 26
Form of the course: on-site learning

Number of credits: 3

Recommended semester: 6.

Educational level: I.

Prerequisites:

Recommended prerequisites:
FMFI.KAG/2-MAT-456/22 Algebra(3)

Course requirements:
Final exam constiting of answers to theoretical questions and solution of an exercise (a proof)
A - 91%+
B - 81%-90%
C - 71%-80%
D - 61%-70%
E - 50%-60%
Fx - less than 50%

Learning outcomes:
Students will master the most important constructions of more advanced group theory and will be able to use them to study the structure and properties of groups.
They will gain basic knowledge about some important concepts and properties of rings and their connection with modern methods of universal algebra.

Class syllabus:
Group action on a set. Sylow's theorems.
Decompositions of rings and modules into direct products. Krull's theorem. Maximal ideals and prime ideals, radical and Jacobson radical. Semi-primitive rings and their characterization. Semi-direct products of rings, Birkhoff's theorem. Hilbert's basis theorem.
Optional: Characteristic subgroups, upper central series and nilpotent groups, compositional series and solvability. Free groups and their subgroups. Schreier's theorem. Free products and free products with amalgamation. Kurosh's theorem.

Recommended literature:
Combinatorial group theory / Roger C. Lyndon, Paul E. Schupp. Berlin : Springer, 2001
The Theory of groups / Marshall Hall, Jr. The Macmillan comp., New York 1959
Kol'ca i moduli / J. Lamberk ; perevod s anglijskogo A. V. Michaljova. Moskva : Mir, 1971
Teacher's electronic text, manuscript.

Languages necessary to complete the course:
slovak, english

Notes:

Past grade distribution
Total number of evaluated students: 7

A	B	C	D	E	FX
71,43	0,0	28,57	0,0	0,0	0,0

Lecturers: doc. RNDr. Jaroslav Guričan, CSc.

Last change: 21.06.2022

Approved by: prof. RNDr. Ján Filo, CSc.

COURSE DESCRIPTION

Academic year: 2025/2026

University: Comenius University Bratislava

Faculty: Faculty of Mathematics, Physics and Informatics

Course ID:	**Course title:**
FMFI.KAG/1-MAT-735/11	Algebra Classes (1)

Educational activities:
Type of activities: practicals
Number of hours:
per week: 1 **per level/semester:** 13
Form of the course: on-site learning

Number of credits: 1

Recommended semester: 3.

Educational level: I.

Prerequisites:

Course requirements:
Ongoing evaluation: homeworks and test
Indicative evaluation scale: A 90%, B 80%, C 70%, D 60%, E 50%
Scale of assessment (preliminary/final): 100/0

Learning outcomes:
Students will acquire practical computational skills related to the topics from the lecture and compulsory practice in course Algebra (1).
During discussions on problems, they will improve in asking questions in the analysis of the problem, gradually building arguments, understand why and how the algorithmic procedures are taken to lead to the desired results, resp. they will learn to notice their limitations.

Class syllabus:
Topics according to the individual interest of the participants, in the following framework: semigroups and monoids, abstract notion of groups, subgroups and subgroups generated by a set, cyclic groups, normal subgroups and their relation to congruences and homomorphisms, Lagrange's theorem, permutation groups, direct product of groups, factor groups , action group on a set.

Recommended literature:
T. Katriňák a kol.: Algebra and theoretical arithmetics 1, Univerzita Komenského, 1999 (slovak)
G. Birkhoff, S. Mac Lane, Survey of modern algebra, Bratislava, Alfa 1979 (slovak transl.)

Languages necessary to complete the course:
slovak, english

Notes:

Past grade distribution
Total number of evaluated students: 191

A	B	C	D	E	FX
46,07	14,66	12,04	14,66	8,38	4,19

Lecturers: doc. RNDr. Martin Mačaj, PhD.

Last change: 14.03.2022
Approved by: prof. RNDr. Ján Filo, CSc.

COURSE DESCRIPTION

Academic year: 2025/2026

University: Comenius University Bratislava

Faculty: Faculty of Mathematics, Physics and Informatics

Course ID:	**Course title:**
FMFI.KAG/1-MAT-736/11	Algebra Classes (2)

Educational activities:
Type of activities: practicals
Number of hours:
per week: 1 **per level/semester:** 13
Form of the course: on-site learning

Number of credits: 1

Recommended semester: 4.

Educational level: I.

Prerequisites:

Course requirements:
Ongoing evaluation: homeworks and test
Indicative evaluation scale: A 90%, B 80%, C 70%, D 60%, E 50%
Scale of assessment (preliminary/final): 100/0

Learning outcomes:
Students will acquire practical computational skills related to the topics from the lecture and compulsory practice in course Algebra (2).
During discussions on problems, they will improve in asking questions in the analysis of the problem, gradually building arguments, understand why and how the algorithmic procedures are taken to lead to the desired results, resp. they will learn to notice their limitations.

Class syllabus:
Topics according to the individual interest of the participants, in the following framework: definitions of rings, integral domains and fields, subrings and ideals, relations between ideals, homomorphisms and ring congruences, construction of the quotient field, factor ring, definition of a ring of polynomials of one indefinite, greatest common divisor of polynomials, decomposition into product of irreducible polynomials, Horner's scheme, Taylor polynomial, polynomial roots and polynomial decomposition into product of root factors, polynomials of several indefinite, symmetric polynomials

Recommended literature:
T. Katriňák a kol.: Algebra and theoretical arithmetics 1, Univerzita Komenského, 1999 (slovak)
G. Birkhoff, S. Mac Lane, Survey of modern algebra, Bratislava, Alfa 1979 (slovak transl.)

Languages necessary to complete the course:

Notes:

Past grade distribution
Total number of evaluated students: 171

A	B	C	D	E	FX
63,16	18,71	5,85	4,68	6,43	1,17

Lecturers: doc. RNDr. Martin Mačaj, PhD.

Last change: 14.03.2022

Approved by: prof. RNDr. Ján Filo, CSc.

STATE EXAM DESCRIPTION

Academic year: 2025/2026	
University: Comenius University Bratislava	
Faculty: Faculty of Mathematics, Physics and Informatics	
Course ID: FMFI.KMANM/1-MAT-991/22	**Course title:** BSc Thesis Defense
Number of credits: 10	
Educational level: I.	
Learning outcomes: The result of successful completion of the state exam will be the defense of a bachelor's thesis.	
Class syllabus: Defense of the bachelor thesis in the form of a presentation to the commission.	
State exam syllabus:	
Recommended literature: How to write university and qualification theses: How to write seminar theses, year theses, student scientific and professional work, diploma theses, final and attestation theses, dissertations / Dušan Katuščák. Bratislava: Stimul, 1998 In Slovak	
Languages necessary to complete the course: Slovak, English	
Last change: 16.03.2022	
Approved by: prof. RNDr. Ján Filo, CSc.	

COURSE DESCRIPTION

Academic year: 2025/2026

University: Comenius University Bratislava

Faculty: Faculty of Mathematics, Physics and Informatics

Course ID:	**Course title:**
FMFI.KMANM/1-MAT-911/23	Bachelor Thesis Seminar

Educational activities:
Type of activities: seminar
Number of hours:
per week: 1 **per level/semester:** 13
Form of the course: on-site learning

Number of credits: 2

Recommended semester: 5.

Educational level: I.

Prerequisites: FMFI.KMANM/1-MAT-210/22 - Mathematical Analysis (3) or FMFI.KMANM/1-MAT-250/22 - Mathematical Analysis (4)

Recommended prerequisites:
Submission of bachelor's thesis assignments by the beginning of the winter semester.

Course requirements:
Mid-term evaluation: compulsory participation in presentations of your classmates
Indicative assessment scale: A 90%, B 80%, C 70%, D 60%, E 50%
Scale of assessment (preliminary/final): Weight of the intermediate / final evaluation: 100/0

Learning outcomes:
Students will learn the formal requirements of writing professional literature and modern methods of presenting their results in professional forums.

Class syllabus:
After mastering the formal requirements of writing professional literature and modern methods of presenting their results, each student will present a current state of their bachelor's thesis during the semester.

Recommended literature:
How to write university and qualification theses: How to write seminar theses, year theses, student scientific and professional work, diploma theses, final and attestation theses, dissertations / Dušan Katuščák. Bratislava: Stimul, 1998
In Slovak

Languages necessary to complete the course:
Slovak, English

Notes:
We recommend students to choose the bachelor's thesis supervisor at the end of the LS in the second year of study and, if necessary, to devote themselves to their topic in their free time during the holidays.

Past grade distribution
Total number of evaluated students: 26

A	B	C	D	E	FX
100,0	0,0	0,0	0,0	0,0	0,0

Lecturers: prof. RNDr. Ján Filo, CSc., RNDr. Kristína Rostás, PhD.

Last change: 22.05.2023

Approved by: prof. RNDr. Ján Filo, CSc.

COURSE DESCRIPTION

Academic year: 2025/2026

University: Comenius University Bratislava

Faculty: Faculty of Mathematics, Physics and Informatics

Course ID:	**Course title:**
FMFI.KMANM/1-MAT-510/00	Biomathematics (1)

Educational activities:
Type of activities: lecture
Number of hours:
per week: 2 **per level/semester:** 26
Form of the course: on-site learning

Number of credits: 3

Recommended semester: 5.

Educational level: I., I.II.

Prerequisites: FMFI.KMANM/1-MAT-250/22 - Mathematical Analysis (4) or FMFI.KMANM/1-MAT-250/14 - Mathematical Analysis (4) or FMFI.KMANM/1-MMN-250/22 - Mathematical Analysis (4) or FMFI.KMANM/1-MMN-250/17 - Mathematical Analysis (4) or FMFI.KMANM/1-BMF-261/22 - Basics of Mathematics (4) or FMFI.KMANM/1-BMF-226/15 - Basics of Mathematics (3)

Course requirements:
Scale of assessment (preliminary/final): 40/60

Learning outcomes:

Class syllabus:
Selection dynamics and population genetics: Hardy-Weinberger law for two and more alleles, the selection equation, the mutation selection equation, the selection recombination equation.
Models of population ecology: logistic equation, Lotka-Volterra equations for predator-prey systems with and without intraspecific competition.

Recommended literature:
J. Hofbauer, K. Sigmund: The Theory of Evolution and Dynamical systems, Cambridge University Press, Cambridge 1988.

Languages necessary to complete the course:

Notes:

Past grade distribution
Total number of evaluated students: 158

A	B	C	D	E	FX
53,16	16,46	17,09	6,96	3,8	2,53

Lecturers: prof. RNDr. Jaroslav Jaroš, CSc.

Last change: 02.06.2015

Approved by: prof. RNDr. Ján Filo, CSc.

COURSE DESCRIPTION

Academic year: 2025/2026

University: Comenius University Bratislava

Faculty: Faculty of Mathematics, Physics and Informatics

Course ID:	**Course title:**
FMFI.KMANM/1-MAT-515/00	Biomathematics (2)

Educational activities:
Type of activities: lecture
Number of hours:
per week: 2 **per level/semester:** 26
Form of the course: on-site learning

Number of credits: 3

Recommended semester: 6.

Educational level: I., I.II.

Prerequisites: FMFI.KMANM/1-MAT-510/00 - Biomathematics (1)

Course requirements:

Learning outcomes:

Class syllabus:
Models of population ecology: the equilibria and their stability, Lotka-Volterra equations for more than two populations.
Game dynamics: evolutionary stable strategies, evolution of phenotypes, equations for asymmetric games.

Recommended literature:
J. Hofbauer, K. Sigmund: The Theory of Evolution and Dynamical systems, Cambridge University Press, Cambridge 1988.

Languages necessary to complete the course:

Notes:

Past grade distribution
Total number of evaluated students: 67

A	B	C	D	E	FX
44,78	16,42	22,39	13,43	1,49	1,49

Lecturers: prof. RNDr. Jaroslav Jaroš, CSc.

Last change: 02.06.2015

Approved by: prof. RNDr. Ján Filo, CSc.

COURSE DESCRIPTION

Academic year: 2025/2026

University: Comenius University Bratislava

Faculty: Faculty of Mathematics, Physics and Informatics

Course ID:	**Course title:**
FMFI.KAI/1-AIN-407/22	Brain and Mind

Educational activities:
Type of activities: course
Number of hours:
per week: 2 **per level/semester:** 26
Form of the course: on-site learning

Number of credits: 3

Recommended semester: 1., 3., 5.

Educational level: I., I.II.

Prerequisites:

Course requirements:
Continuous assessment: presence (30%), presentation (40%), bonus assignments (30%)
Indicative assessment scale: A 90%, B 80%, C 70%, D 60%, E 50%
Scale of assessment (preliminary/final): 100/0

Learning outcomes:
The course objectives are to make the students familiar with major theories and methods of mind/ brain research.

Class syllabus:
The subject of the course is the human mind and brain from the perspective of neuroscience, computer science, psychology, and philosophy. It is mainly focused on the interdisciplinary study of consciousness: its neural correlates, neuroscience and behavioral research methods, and major theories.

Recommended literature:
S. Blackmore, E.T. Troscianko: Consciousnes. An Introduction. Routledge, third edition 2018.
M.S. Gazzaniga, R.B. Ivry, G.R. Mangun: Cognitive Neuroscience. The Biology of the Mind. W.W. Norton & company, fifth edition 2019.
J. Friedenberg, G. Silverman: Cognitive Science. An Introduction to the Study of Mind. Sage 2012.
T. Metzinger: The Ego Tunnel. The Science of the Mind and the Myth of the self. Basic Books 2009.

Languages necessary to complete the course:
Slovak, English

Notes:

Past grade distribution Total number of evaluated students: 235					
A	B	C	D	E	FX
50,64	15,32	13,19	9,79	2,98	8,09
Lecturers: RNDr. Barbora Cimrová, PhD., doc. PhDr. Ján Rybár, PhD.					
Last change: 04.07.2022					
Approved by: prof. RNDr. Ján Filo, CSc.					

COURSE DESCRIPTION

Academic year: 2025/2026

University: Comenius University Bratislava

Faculty: Faculty of Mathematics, Physics and Informatics

Course ID:	**Course title:**
FMFI.KMANM/1-MAT-430/00	Classical Methods of Solving Differential Equations

Educational activities:
Type of activities: lecture / practicals
Number of hours:
per week: 2 / 2 **per level/semester:** 26 / 26
Form of the course: on-site learning

Number of credits: 5

Recommended semester: 6.

Educational level: I.

Prerequisites: FMFI.KMANM/1-MAT-310/00 - Ordinary Differential Equations (1)

Course requirements:
Interim assessment: During the semester, there will be two written examinations for a total of 32 points. The student gets the next 18 points for working on the exercises according to the instructions of the assistant professor who leads them.
Exam: The exam consists of a written and an oral part.
Indicative assessment scale: A 92%, B 84%, C 76%, D 68%, E 60%
Scale of assessment (preliminary/final): 50/50

Learning outcomes:
The graduate of this course has knowledge of the classical theory of basic types of partial differential equations and is able to use them to solve specific problems of linear PDR.

Class syllabus:
1. First order linear PDR (characteristic method)
2. Wave equation - d´Alambert's formula, Kirchhoff's formula, Duhamel's principle
3. Heat conduction equation
4. Method of separation of variables
5. Laplace equation

Recommended literature:
L.C. Evans: Partial Differential Equations, Graduate Studies in Mathematics, Volume 19, AMS 1998.
V.J. Arsenin: Matematická fyzika (Základné rovnice a špeciálne funkcie), Alfa, Bratislava 1977.
J. Kačur: Vybrané kapitoly z matematickej fyziky I, MFF UK, 1988.
D. Ševčovič: Parciálne diferenciálne rovnice, www.iam.fmph.uniba.sk/skripta/sevcovic
J. Francu: Parciální diferenciální rovnice, VUT v Brne, Fakulta strojní 1998.

Languages necessary to complete the course:
Slovak, English

Notes:

Past grade distribution Total number of evaluated students: 94					
A	B	C	D	E	FX
24,47	20,21	11,7	19,15	18,09	6,38
Lecturers: prof. RNDr. Ján Filo, CSc., RNDr. Kristína Rostás, PhD.					
Last change: 21.06.2022					
Approved by: prof. RNDr. Ján Filo, CSc.					

COURSE DESCRIPTION

Academic year: 2025/2026

University: Comenius University Bratislava

Faculty: Faculty of Mathematics, Physics and Informatics

Course ID:	**Course title:**
FMFI.KAI/1-AIN-408/22	Cognitive Laboratory

Educational activities:
Type of activities: course
Number of hours:
per week: 2 **per level/semester:** 26
Form of the course: on-site learning

Number of credits: 2

Recommended semester: 1., 3., 5.

Educational level: I., I.II.

Prerequisites:

Course requirements:
Interim evaluation: presentations
Indicative assessment scale: A 90%, B 80%, C 70%, D 60%, E 50%
Scale of assessment (preliminary/final): 100/0

Learning outcomes:
Acquisition of methods for studying various cognitive phenomena (data collection and analysis) using an online cognitive laboratory.

Class syllabus:
Demonstration of 40 standard experiments in the fields of neurocognition, mechanisms of perception, attention systems, memory processes, speech production and perception, knowledge representation (concepts and mental ideas), judgment and decision-making processes.

Recommended literature:
CogLab / Greg Francis, Ian Neath, Daniel R. VanHorn. Thomson/Wadsworth, 2014

Languages necessary to complete the course:
Slovak, English

Notes:

Past grade distribution
Total number of evaluated students: 94

A	B	C	D	E	FX
64,89	12,77	9,57	1,06	0,0	11,7

Lecturers: doc. PhDr. Ján Rybár, PhD.

Last change: 17.05.2024

Approved by: prof. RNDr. Ján Filo, CSc.

COURSE DESCRIPTION

Academic year: 2025/2026

University: Comenius University Bratislava

Faculty: Faculty of Mathematics, Physics and Informatics

Course ID:	**Course title:**
FMFI.KAG/1-MAT-490/00	Combinatorics

Educational activities:
Type of activities: lecture
Number of hours:
per week: 2 **per level/semester:** 26
Form of the course: on-site learning

Number of credits: 3

Recommended semester: 6.

Educational level: I.

Prerequisites:

Course requirements:
Continuous evaluation: homework (20 p.)
Final exam: written exam (80 p.)
Grades: A 90%, B 80%, C 70%, D 60%, E 50%
Scale of assessment (preliminary/final): 20/80

Learning outcomes:
Uderstanding of algebraic interplays of some main theorems of discrete mathematics, gaining knowledge and technigues of extremal set theory and extremal graph theory.

Class syllabus:
Systems of distinct representatives, matchings, algebraic interplays, latin squares and recktangles, finite projective planes, Dilworth theorem and extremal set theory, intersection families of sets.

Recommended literature:
Algebraické metody diskrétní matematiky / Luděk Kučera, Jaroslav Nešetřil. Praha : Státní nakladatelství technické literatury, 1989
Combinatorial set theory : With a gentle introduction to forcing / Lorenz J. Halbeisen. London : Springer, 2012
Kapitoly z diskrétní matematiky / Jiří Matoušek, Jaroslav Nešetřil. Praha : Karolinum, 2003

Languages necessary to complete the course:
slovak, english

Notes:

Past grade distribution
Total number of evaluated students: 46

A	B	C	D	E	FX
56,52	23,91	8,7	6,52	4,35	0,0

Lecturers: prof. RNDr. Róbert Jajcay, DrSc.

Last change: 19.06.2022
Approved by: prof. RNDr. Ján Filo, CSc.

COURSE DESCRIPTION

Academic year: 2025/2026

University: Comenius University Bratislava

Faculty: Faculty of Mathematics, Physics and Informatics

Course ID:	**Course title:**
FMFI.KMANM/1-MAT-737/19	Complex Analysis Classes

Educational activities:
Type of activities: practicals
Number of hours:
per week: 2 **per level/semester:** 26
Form of the course: on-site learning

Number of credits: 2

Recommended semester: 6.

Educational level: I.

Prerequisites:

Recommended prerequisites:
1-MAT-110 Mathematical analysis (1), 1-MAT-150 Mathematical analysis (2)

Course requirements:
Final evaluation based on the semestral evaluation from mandatory subject Theory of functions of complex variable and attendance.
100 - 90 % A
89 - 80 % B
79 - 70 % C
69 - 55 % D
54 - 40 % E
less than 40 % FX
Scale of assessment (preliminary/final): 100/0

Learning outcomes:
Students will gain basic knowledge in the field of complex analysis.

Class syllabus:
Complex numbers, complex plane. Stereographic projection. Paths, curves. Connected and linearly connected sets. The concept of convergence, limits, continuity and differentiability of functions of a complex variable. Conformal mappings. Curve integral of a function of complex variable. Closed paths integration theorems. Taylor and Laurent series. Properties of holomorphic functions. Runge's theorem. Isolated singular points of holomorphic functions. Residues and calculation of improper integrals. The argument principle and Rouche's theorem. Open mapping theorem.

Recommended literature:
Б.В. Шабат: ВВЕДЕНИЕ В КОМПЛЕКСНЫЙ АНАЛИЗ (in russian or english),
M. Demetrian: Základy teórie funkcií komplexnej premennej

Languages necessary to complete the course:
slovak, english or russian

Notes:
It is recommended to follow courses 1-MAT-210 Mathematical analysis (3), 1-MAT-250 Mathematical analysis (4) a 1-MAT-801 Topology along with this course

Past grade distribution
Total number of evaluated students: 33

A	B	C	D	E	FX
27,27	3,03	15,15	15,15	18,18	21,21

Lecturers: Mgr. Július Pačuta, PhD.

Last change: 16.06.2022

Approved by: prof. RNDr. Ján Filo, CSc.

COURSE DESCRIPTION

Academic year: 2025/2026

University: Comenius University Bratislava

Faculty: Faculty of Mathematics, Physics and Informatics

Course ID:	**Course title:**
FMFI.KAMŠ/1-PMA-730/00	Computer Statistics

Educational activities:
Type of activities: lecture
Number of hours:
per week: 2 **per level/semester:** 26
Form of the course: on-site learning

Number of credits: 3

Recommended semester: 5.

Educational level: I.

Prerequisites: FMFI.KAMŠ/1-MAT-282/00 - Probability and Statistics (2)

Recommended prerequisites:
Probability and statistics (2) 1-MAT-282

Course requirements:
project (teaching period), written exam using computer
Approximate grade thresholds: A 90%, B 80%, C 70%, D 60%, E 50%
Scale of assessment (preliminary/final): 20/80

Learning outcomes:
Using the software "R" students will be able to perform basic statistical analysis of real data.

Class syllabus:
History of R and comparison with other systems. Arithmetic, logical operators. Data import and visualization, descriptive statistics. Tests of normality. Tests about location parameters, proportions, and correlation coefficients. Linear regression: estimates, tests, confidence regions, submodels, diagnostic. ANOVA. Modern methods of statistics (cluster and discriminant analysis, Monte Carlo).

Recommended literature:
Dalgaard P: Introductory Statistics with R. Springer 2008.
Anděl J: Statistické metody. Matfyzpress 2007.
Venables W N et al.: An Introduction to R. The R Foundation 2021.

Languages necessary to complete the course:
Slovak, English

Notes:

Past grade distribution
Total number of evaluated students: 277

A	B	C	D	E	FX
43,68	14,8	9,03	13,0	12,27	7,22

Lecturers: Mgr. Ján Somorčík, PhD.

Last change: 11.03.2022
Approved by: prof. RNDr. Ján Filo, CSc.

COURSE DESCRIPTION

Academic year: 2025/2026

University: Comenius University Bratislava

Faculty: Faculty of Mathematics, Physics and Informatics

Course ID:	**Course title:**
FMFI.KAMŠ/1-PMA-750/22	Data Analysis and Visualization

Educational activities:
Type of activities: practicals
Number of hours:
per week: 2 **per level/semester:** 26
Form of the course: on-site learning

Number of credits: 2

Recommended semester: 6.

Educational level: I.

Prerequisites: FMFI.KAMŠ/1-MAT-281/00 - Probability and Statistics (1)

Course requirements:
Preliminary evaluation: tests (40%), project (60%)
Rating scale: A 90%, B 80%, C 70%, D 60%, E 50%
Scale of assessment (preliminary/final): 100/0

Learning outcomes:
After completing the course the students will be able to use the MS Excel environment for processing, visualizing and analyzing real data.

Class syllabus:
Mathematical functions in MS Excel. Probability distributions. Processing and visualization of the data. Excel VBA introduction. Descriptive statistics. Parameter estimation, hypothesis testing, regression analysis.
Probability distributions in MS Excel (probability, distribution, quantile functions, data generation). Descriptive statistics in MS Excel environment (sample characteristics). Advanced data vizualization methods (eg box plot, time series vizualization), Power BI. Basics of inference statistics (parameter estimation, hypothesis testing, linear regression analysis). Solver and Data Analysis add-ins.

Recommended literature:
Pravdepodobnosť a štatistika / Katarína Janková, Andrej Pázman. Bratislava: Univerzita Komenského, 2011
Štatistika v Exceli 2007 / Jozef Chajdiak. Statis, Bratislava 2009

Languages necessary to complete the course:
Slovak, English

Notes:

Past grade distribution Total number of evaluated students: 258					
A	B	C	D	E	FX
37,21	22,48	18,99	10,85	6,2	4,26
Lecturers: Mgr. Lívia Rosová, PhD.					
Last change: 21.06.2022					
Approved by: prof. RNDr. Ján Filo, CSc.					

COURSE DESCRIPTION

Academic year: 2025/2026

University: Comenius University Bratislava

Faculty: Faculty of Mathematics, Physics and Informatics

Course ID:	**Course title:**
FMFI.KAG/1-MAT-140/00	Discrete Mathematics (1)

Educational activities:
Type of activities: lecture / practicals
Number of hours:
per week: 2 / 1 **per level/semester:** 26 / 13
Form of the course: on-site learning

Number of credits: 4

Recommended semester: 1.

Educational level: I.

Prerequisites:

Course requirements:
Work during the semester: 2 midterm exams (each 18%), homework (14%)
Final exam: written exam (15 points needed to pass the written exam)
Approximate grade scheme: A 85%, B 70%, C 55%, D 45%, E 35%
Scale of assessment (preliminary/final): 50/50

Learning outcomes:
Students will acquire skills in manipulating, describing and searching for the properties of simple mathematical objects (propositions, sets, relations) with emphasis on their exact symbolic notation, details, correct interpretation, models, examples, counterexamples.
Students will improve in abstract reasoning, which uses formal logical arguments, relational properties of objects, and quantifiers (existential and universal).

Class syllabus:
Types of proofs in mathematics, propositions, propositional functions. Propositional calculus, predicate logic. The basic set operations, relations, partial orders, mappings. Finite and infinite sets, countable and uncountable sets. Cardinal numbers.

Recommended literature:
Množiny a všeličo okolo nich / Lev Bukovský. Košice : Univerzita Pavla Jozefa Šafárika, 2005
Diskrétna matematika 1 : Úvod do teórie množín, teórie booleovských funkcií a matematickej logiky / Daniel Olejár, Škoviera Martin. Bratislava : Univerzita Komenského, 1992

Languages necessary to complete the course:
English, Slovak

Notes:

Past grade distribution
Total number of evaluated students: 1023

A	B	C	D	E	FX
10,95	11,14	16,91	26,98	23,36	10,65

Lecturers: Mgr. Martin Niepel, PhD., prof. RNDr. Róbert Jajcay, DrSc., RNDr. Jana Chalmovianská, PhD.
Last change: 14.03.2022
Approved by: prof. RNDr. Ján Filo, CSc.

COURSE DESCRIPTION

Academic year: 2025/2026

University: Comenius University Bratislava

Faculty: Faculty of Mathematics, Physics and Informatics

Course ID:	**Course title:**
FMFI.KAG/1-MAT-725/00	Discrete Mathematics (2)

Educational activities:
Type of activities: lecture / practicals
Number of hours:
per week: 2 / 1 **per level/semester:** 26 / 13
Form of the course: on-site learning

Number of credits: 4

Recommended semester: 2.

Educational level: I.

Prerequisites: FMFI.KAG/1-MAT-140/00 - Discrete Mathematics (1)

Course requirements:
Continuous evaluation: homework control (50 p.)
Final exam: written (50 p.)
Grades: A 90%, B 80%, C 70%, D 60%, E 50%
Scale of assessment (preliminary/final): 50/50

Learning outcomes:
Active use of basic enumeration methods of discrete mathematics, acquiring knowledge of specific basic topics in graph therory.

Class syllabus:
Fundamental counting rules - recurrences, inclusion/exclusion. Binomical coefficients and their properties, combinatorial identities. The basic notions in graph theory. The minimal spanning tree problem. Walks in a graph-exclusion trail, hamiltonian cycle. Drawing of a graph on a surface, planar graphs, Euler's formula. Platonic solids. Colouring of a graph, the chromatic number and the chromatic index of a graph. The Four-Colour Theorem. Pigeonhole principle, Ramsey numbers.

Recommended literature:
Kapitoly z diskrétní matematiky / Jiří Matoušek, Jaroslav Nešetřil. Praha : Karolinum, 2000
Introductory combinatorics / Richard A. Brualdi. Upper Saddle River : Pearson Prentice Hall, 2004
Applied and algorithmic graph theory / Gary Chartrand, Ortrud R. Oellermann. New York : McGraw Hill, 1993

Languages necessary to complete the course:
slovak, english

Notes:

Past grade distribution
Total number of evaluated students: 189

A	B	C	D	E	FX
54,5	5,29	14,81	11,64	8,99	4,76

Lecturers: RNDr. Martin Sleziak, PhD., Mgr. Martin Niepel, PhD., prof. RNDr. Róbert Jajcay, DrSc.

Last change: 19.06.2022

Approved by: prof. RNDr. Ján Filo, CSc.

COURSE DESCRIPTION

Academic year: 2025/2026

University: Comenius University Bratislava

Faculty: Faculty of Mathematics, Physics and Informatics

Course ID:	**Course title:**
FMFI.KAMŠ/1-EFM-380/00	Econometrics

Educational activities:
Type of activities: lecture / practicals
Number of hours:
per week: 2 / 2 **per level/semester:** 26 / 26
Form of the course: on-site learning

Number of credits: 5

Recommended semester: 6.

Educational level: I., II.

Prerequisites: FMFI.KAMŠ/1-EFM-330/00 - Statistical Methods or FMFI.KAMŠ/2-MMN-380/22 - Time Series Analysis or FMFI.KAMŠ/2-PMS-107/15 - Regression Models or FMFI.KAMŠ/1-DAV-303/20 - Statistical Methods or FMFI.KAMŠ/1-PMA-510/00 - Basics of Mathematical Statistics

Recommended prerequisites:
Statistical methods 1-EFM-330 or Statistical methods 1-DAV-303 or Computer statistics 2-MMN-106

Course requirements:
Continuing evaluation: project (10%) and test (20%); at least 10% out of 30% are needed to proceed to the final exam
Exam: written exam
Approximate grade thresholds: A 90%, B 80%, C 70%, D 60%, E 50%
Scale of assessment (preliminary/final): 30/70

Learning outcomes:
Students are able to perform standard linear regression analysis and also are able to apply it in real econometric research. They also understand the mathematics behind these methods, being a necessary condition for further studies in this subject.

Class syllabus:
Linear regression, the geometry behind it, and LS-estimators of parameters. Decomposition of the Total Sum of Squares, coefficients of determination, and the Akaike information criterion. Properties of the parameter estimators and of the error term variance estimator. Gauss-Markov theorem. Tests of linear hypotheses about parameters. Restricted regression. Model specification errors and their diagnostic. Dummy variables. Generalized least squares. Heteroscedasticity: testing for and dealing with. Autocorrelation: testing for and dealing with.

Recommended literature:
Johnston J, DiNardo J: Econometric methods 4th ed. McGraw Hill 1997;
Greene W: Econometric Analysis 8th ed. Pearson 2017;
Zvára K: Regrese. MatfyzPress, 2008.

Languages necessary to complete the course:
Slovak, English

Notes:

Past grade distribution
Total number of evaluated students: 1330

A	B	C	D	E	FX
28,87	16,17	17,97	16,99	16,77	3,23

Lecturers: Mgr. Ján Somorčík, PhD., Mgr. Samuel Rosa, PhD., Mgr. Pál Somogyi

Last change: 25.06.2022

Approved by: prof. RNDr. Ján Filo, CSc.

COURSE DESCRIPTION

Academic year: 2025/2026

University: Comenius University Bratislava

Faculty: Faculty of Mathematics, Physics and Informatics

Course ID:	**Course title:**
FMFI.KJP/1-MXX-233/13	English Conversation Course (1)

Educational activities:
Type of activities: practicals
Number of hours:
per week: 2 **per level/semester:** 26
Form of the course: on-site learning

Number of credits: 2

Recommended semester: 3., 5.

Educational level: I., I.II., II.

Prerequisites:

Course requirements:
tests, presentations, essays
Course prerequisites:
https://fmph.uniba.sk/microsites/kjp/katedra-jazykovej-pripravy/poziadavky-na-udelenie-priebezneho-hodnotenia-aj1aj2aj3-ostatne-kurzy/
Scale of assessment (preliminary/final): 100/0

Learning outcomes:
Continual improvement of all language skills focused on communication/speaking, listening comprehension and writing. The emphasis is on discourse, lexicology and morphology, word-bank broadening of communicational English as well as English for specific purposes appropriate for university students. This course is a follow up of the previously taught ESP course.

Class syllabus:
This course's focus is to broaden spoken/communicational English for students with B2/C1 level of English knowledge.

Recommended literature:
Appropriate study material is supplied based on the participants'level of English by the lecturer. (Sources- The Guardian, The Herald Morning Sun. The Nine News, The West Australian, BBC News and podcasts, CNN podcasts).

Languages necessary to complete the course:

Notes:

Past grade distribution
Total number of evaluated students: 291

A	B	C	D	E	FX
75,26	9,62	4,81	1,37	1,03	7,9

Lecturers: Mgr. Aneta Barnes

Last change: 11.04.2024
Approved by: prof. RNDr. Ján Filo, CSc.

COURSE DESCRIPTION

Academic year: 2025/2026

University: Comenius University Bratislava

Faculty: Faculty of Mathematics, Physics and Informatics

Course ID:	**Course title:**
FMFI.KJP/1-MXX-234/13	English Conversation Course (2)

Educational activities:
Type of activities: practicals
Number of hours:
per week: 2 **per level/semester:** 26
Form of the course: on-site learning

Number of credits: 2

Recommended semester: 4., 6.

Educational level: I., I.II., II.

Prerequisites:

Course requirements:
tests, oral presentations, essays
Course prerequisites:
https://fmph.uniba.sk/microsites/kjp/katedra-jazykovej-pripravy/poziadavky-na-udelenie-priebezneho-hodnotenia-aj1aj2aj3-ostatne-kurzy/
Scale of assessment (preliminary/final): 100/0

Learning outcomes:
Continual improvement of all language skills focused on communication/speaking, listening comprehension and writing. The emphasis is on discourse, lexicology and morphology, word-bank broadening of communicational/spoken English as well as English for specific purpose appropriate for university students. This course is a follow up of the Conversational English course 1.

Class syllabus:
This course's focus is to broaden spoken/communicational English for students with B2/C1 level of English knowledge(Upper-Intermediate/Lower Advanced).

Recommended literature:
Appropriate study material is supplied based on the participants'level of English by the lecturer. (Sources- The Guardian, The Herald Morning Sun. The Nine News, The West Australian, BBC News and podcasts, CNN podcasts).

Languages necessary to complete the course:

Notes:

Past grade distribution
Total number of evaluated students: 201

A	B	C	D	E	FX
82,09	8,96	2,49	1,0	0,0	5,47

Lecturers: Mgr. Aneta Barnes

Last change: 11.04.2024
Approved by: prof. RNDr. Ján Filo, CSc.

COURSE DESCRIPTION

Academic year: 2025/2026

University: Comenius University Bratislava

Faculty: Faculty of Mathematics, Physics and Informatics

Course ID:	**Course title:**
FMFI.KJP/1-MXX-131/00	English Language (1)

Educational activities:
Type of activities: practicals
Number of hours:
per week: 2 **per level/semester:** 26
Form of the course: on-site learning

Number of credits: 2

Recommended semester: 1.

Educational level: I., I.II.

Prerequisites:

Course requirements:
Grades: A 93%, B 85%, C 77%, D 70%, E 65%
Course prerequisites:
https://fmph.uniba.sk/microsites/kjp/katedra-jazykovej-pripravy/poziadavky-na-udelenie-priebezneho-hodnotenia-aj1aj2aj3-ostatne-kurzy/
Scale of assessment (preliminary/final): 100/0

Learning outcomes:
The objective of the subject is to provide the students with experience and knowledge of technical English and thus make them ready to use English sources of information for later study and professional career.

Class syllabus:
On entering the first semester, students´ knowledge of English is tested and they are divided into groups according to the results of the placement test. In the groups of pre-intermediate and intermediate students, fundamentals of technical English are taught. Advanced students take classes of technical English for their field of study: English for mathematics, for physics, for computer science, English for management and economic and financial mathemathics.

Recommended literature:
Anglický jazyk pre študentov FMFI UK : Kurz pre mierne pokročilých / Alena Zemanová.
The textbook has not been published. It is at students' disposal in an electronic format.
Anglický jazyk pre študentov FMFI UK : Aplikovaná matematika / Alexandra Maďarová, Ľubomíra Kožehubová.
The textbook has not been published. It is at students' disposal in an electronic format.
Anglický jazyk pre študentov FMFI UK : Matematika / kolektív autorov KJP.
The textbook has not been published. It is at students' disposal in an electronic format.
Anglický jazyk pre študentov FMFI UK : Fyzika / Alena Zemanová.
The textbook has not been published. It is at students' disposal in an electronic format.
Anglický jazyk pre študentov FMFI UK : Informatika / Elena Klátiková.
The textbook has not been published. It is at students' disposal in an electronic format.

Languages necessary to complete the course:
Slovak, English

Notes:

Past grade distribution
Total number of evaluated students: 7132

A	B	C	D	E	FX
29,54	23,11	18,17	12,56	7,84	8,78

Lecturers: Mgr. Eva Foltánová, Mgr. Ing. Jana Kočvarová, Mgr. Ľubomíra Kožehubová, Mgr. Alexandra Maďarová, PhDr. Alena Zemanová, Mgr. Aneta Barnes, Mgr. Simona Dobiašová, PhD.

Last change: 20.06.2022

Approved by: prof. RNDr. Ján Filo, CSc.

COURSE DESCRIPTION

Academic year: 2025/2026

University: Comenius University Bratislava

Faculty: Faculty of Mathematics, Physics and Informatics

Course ID:	**Course title:**
FMFI.KJP/1-MXX-132/00	English Language (2)

Educational activities:
Type of activities: practicals
Number of hours:
per week: 2 **per level/semester:** 26
Form of the course: on-site learning

Number of credits: 2

Recommended semester: 2.

Educational level: I., I.II.

Prerequisites:

Course requirements:
Grades: A 93%, B 85%, C 77%, D 70%, E 65%
Course prerequisites:
https://fmph.uniba.sk/microsites/kjp/katedra-jazykovej-pripravy/poziadavky-na-udelenie-priebezneho-hodnotenia-aj1aj2aj3-ostatne-kurzy/
Scale of assessment (preliminary/final): 100/0

Learning outcomes:
The objective of the subject is to provide the students with experience and knowledge of technical English and thus make them ready to use English sources of information for later study and professional career.

Class syllabus:
This is a continuation of the course English (1) designed for pre-intermediate students. Fundamental vocabulary is presented through selected topics in mathematics, physics and informatics. The lessons also contain revision of elementary grammar. Generally, it is a necessary preliminary to advanced programs.

Recommended literature:
Anglický jazyk pre študentov FMFI UK : Kurz pre mierne pokročilých / Alena Zemanová.
The textbook has not been published. It is at students' disposal in an electronic format.

Languages necessary to complete the course:
Slovak, English

Notes:

Past grade distribution
Total number of evaluated students: 1733

A	B	C	D	E	FX
22,1	20,95	23,83	14,77	11,08	7,27

Lecturers: PhDr. Alena Zemanová, Mgr. Ing. Jana Kočvarová, Mgr. Alexandra Maďarová, Mgr. Ľubomíra Kožehubová, Mgr. Eva Foltánová, Mgr. Aneta Barnes, Mgr. Simona Dobiašová, PhD.
Last change: 20.06.2022
Approved by: prof. RNDr. Ján Filo, CSc.

COURSE DESCRIPTION

Academic year: 2025/2026

University: Comenius University Bratislava

Faculty: Faculty of Mathematics, Physics and Informatics

Course ID:	**Course title:**
FMFI.KJP/1-MXX-231/00	English Language (3)

Educational activities:
Type of activities: practicals
Number of hours:
per week: 2 **per level/semester:** 26
Form of the course: on-site learning

Number of credits: 2

Recommended semester: 3.

Educational level: I., I.II.

Prerequisites:

Course requirements:
Grades: A 93%, B 85%, C 77%, D 70%, E 65%
Course prerequisites:
https://fmph.uniba.sk/microsites/kjp/katedra-jazykovej-pripravy/poziadavky-na-udelenie-priebezneho-hodnotenia-aj1aj2aj3-ostatne-kurzy/
Scale of assessment (preliminary/final): 100/0

Learning outcomes:
The objective of the classes is to provide the students with knowledge of technical English in their field of study and experience with technical English sources sufficient to make the able to use technical language for their later study and professional purposes.

Class syllabus:
The subject continues the program of English (2). Students take classes of special English for their field of study: English for mathematics, English for physics, English for computer science, English for management and economic and financial mathemathics.
The subject requires advanced knowledge of general English.

Recommended literature:
Anglický jazyk pre študentov FMFI UK : Kurz pre mierne pokročilých / Alena Zemanová.
The textbook has not been published. It is at students' disposal in an electronic format.
Anglický jazyk pre študentov FMFI UK : Aplikovaná matematika / Alexandra Maďarová, Ľubomíra Kožehubová.
The textbook has not been published. It is at students' disposal in an electronic format.
Anglický jazyk pre študentov FMFI UK : Matematika / kolektív autorov KJP.
The textbook has not been published. It is at students' disposal in an electronic format.
Anglický jazyk pre študentov FMFI UK : Fyzika / Alena Zemanová.
The textbook has not been published. It is at students' disposal in an electronic format.
Anglický jazyk pre študentov FMFI UK : Informatika / Elena Klátiková.
The textbook has not been published. It is at students' disposal in an electronic format.

Languages necessary to complete the course:

Slovak, English

Notes:

Past grade distribution
Total number of evaluated students: 1422

A	B	C	D	E	FX
15,47	19,06	22,78	18,35	18,0	6,33

Lecturers: PhDr. Alena Zemanová, Mgr. Ing. Jana Kočvarová, Mgr. Alexandra Maďarová, Mgr. Ľubomíra Kožehubová, Mgr. Eva Foltánová, Mgr. Aneta Barnes, Mgr. Simona Dobiašová, PhD.

Last change: 20.06.2022

Approved by: prof. RNDr. Ján Filo, CSc.

COURSE DESCRIPTION

Academic year: 2025/2026

University: Comenius University Bratislava

Faculty: Faculty of Mathematics, Physics and Informatics

Course ID:	**Course title:**
FMFI.KJP/1-MXX-232/10	English Language (4)

Educational activities:
Type of activities: practicals
Number of hours:
per week: 2 **per level/semester:** 26
Form of the course: on-site learning

Number of credits: 2

Recommended semester: 4.

Educational level: I., I.II.

Prerequisites:

Course requirements:
Examination: an examination consisting of a written and an oral part.
Grades: A 93%, B 85%, C 77%, D 70%, E 65%
Course prerequisites:
https://fmph.uniba.sk/microsites/kjp/katedra-jazykovej-pripravy/skuska-z-predmetu-anglicky-jazyk-4/
Scale of assessment (preliminary/final): 0/100

Learning outcomes:
After completing the course, students will be able to work independently with professional literature in English

Class syllabus:
Students take classes of special English for their field of study: English for mathematics, English for physics, English for computer science, English for management and economic and financial mathemathics.

Recommended literature:
Anglický jazyk pre študentov FMFI UK : Kurz pre mierne pokročilých / Alena Zemanová.
The textbook has not been published. It is at students' disposal in an electronic format.
Anglický jazyk pre študentov FMFI UK : Aplikovaná matematika / Alexandra Maďarová, Ľubomíra Kožehubová.
The textbook has not been published. It is at students' disposal in an electronic format.
Anglický jazyk pre študentov FMFI UK : Matematika / kolektív autorov KJP.
The textbook has not been published. It is at students' disposal in an electronic format.
Anglický jazyk pre študentov FMFI UK : Fyzika / Alena Zemanová.
The textbook has not been published. It is at students' disposal in an electronic format.
Anglický jazyk pre študentov FMFI UK : Informatika / Elena Klátiková.
The textbook has not been published. It is at students' disposal in an electronic format.

Languages necessary to complete the course:
Slovak, English

Notes:

Past grade distribution
Total number of evaluated students: 4292

A	B	C	D	E	FX
25,19	28,1	21,6	11,84	6,06	7,22

Lecturers: Mgr. Ing. Jana Kočvarová, Mgr. Alexandra Maďarová, PhDr. Alena Zemanová, Mgr. Ľubomíra Kožehubová, Mgr. Eva Foltánová, Mgr. Aneta Barnes, Mgr. Simona Dobiašová, PhD.

Last change: 17.06.2022

Approved by: prof. RNDr. Ján Filo, CSc.

COURSE DESCRIPTION

Academic year: 2025/2026

University: Comenius University Bratislava

Faculty: Faculty of Mathematics, Physics and Informatics

Course ID:	**Course title:**
FMFI.KAG+KAI/1-MAT-575/00	Figure Recognition and Image Processing

Educational activities:
Type of activities: course
Number of hours:
per week: 2 **per level/semester:** 26
Form of the course: on-site learning

Number of credits: 3

Recommended semester: 6.

Educational level: I.

Prerequisites:

Course requirements:
It is necessary to obtain at least 90% of the points to obtain A grade, at least 80% of points to grade B, at least 70% of points to grade C, at least 60% to grade D and at least 50% to grade E.
For the semester, the student can get 30% for independent work and activity.
The final written exam has a weight of 70%.
Scale of assessment (preliminary/final): 30/70

Learning outcomes:

Class syllabus:
Image acquisition.
Properties of digital image.
Image transformations.
Methods of image pre-processing.
Segmentation.
Representation of shape and its description.
Pattern recognition.
Statistical and syntactic methods of recognition
Mathematical morfology.
Processing of textures.

Recommended literature:
Gonzalez, Woods: Digital Image processing, 1992
Hlaváč - Šonka: Počítačové vidění, 1992
Boyle - Šonka - Hlaváč: Image procesing, analysis and machine vision, 1999

Languages necessary to complete the course:

Notes:

Past grade distribution Total number of evaluated students: 114					
A	B	C	D	E	FX
21,93	29,82	28,95	12,28	3,51	3,51
Lecturers: doc. RNDr. Andrej Ferko, PhD., doc. RNDr. Zuzana Černeková, PhD.					
Last change: 23.06.2022					
Approved by: prof. RNDr. Ján Filo, CSc.					

COURSE DESCRIPTION

Academic year: 2025/2026

University: Comenius University Bratislava

Faculty: Faculty of Mathematics, Physics and Informatics

Course ID:	**Course title:**
FMFI.KJP/1-MXX-141/00	French Language (1)

Educational activities:
Type of activities: practicals
Number of hours:
per week: 2 **per level/semester:** 26
Form of the course: on-site learning

Number of credits: 2

Recommended semester: 1.

Educational level: I., I.II., II.

Prerequisites:

Course requirements:
Scale of assessment (preliminary/final): 100/0

Learning outcomes:

Class syllabus:
French language is taught at two levels: beginner and intermediate. Students opt for one of them depending on whether they wish to obtain the fundamentals of the language or wish to maintain and/or improve previous knowledge of French.

Recommended literature:
Capelle Guy, Menand Robert: Le Nouveau taxi 1, Hachette FLE Paris, France 2009, ISBN 978-2-01-155548 - 9

Languages necessary to complete the course:

Notes:

Past grade distribution
Total number of evaluated students: 482

A	B	C	D	E	FX
48,76	19,09	17,01	8,09	2,07	4,98

Lecturers: Mgr. Ľubomíra Kožehubová

Last change: 20.06.2022

Approved by: prof. RNDr. Ján Filo, CSc.

COURSE DESCRIPTION

Academic year: 2025/2026

University: Comenius University Bratislava

Faculty: Faculty of Mathematics, Physics and Informatics

Course ID:	**Course title:**
FMFI.KJP/1-MXX-142/00	French Language (2)

Educational activities:
Type of activities: practicals
Number of hours:
per week: 2 **per level/semester:** 26
Form of the course: on-site learning

Number of credits: 2

Recommended semester: 2.

Educational level: I., I.II., II.

Prerequisites:

Course requirements:
Scale of assessment (preliminary/final): 100/0

Learning outcomes:

Class syllabus:
The subject continues the program of French language (1) and provides courses of essential and intermediate French language.

Recommended literature:
Capelle Guy, Menand Robert: Le Nouveau taxi 1, Hachette FLE Paris, France 2009, ISBN 978-2-01-155548 - 9

Languages necessary to complete the course:

Notes:

Past grade distribution
Total number of evaluated students: 307

A	B	C	D	E	FX
45,6	22,48	16,94	8,79	2,28	3,91

Lecturers: Mgr. Ľubomíra Kožehubová

Last change: 20.06.2022

Approved by: prof. RNDr. Ján Filo, CSc.

COURSE DESCRIPTION

Academic year: 2025/2026

University: Comenius University Bratislava

Faculty: Faculty of Mathematics, Physics and Informatics

Course ID:	**Course title:**
FMFI.KJP/1-MXX-241/00	French Language (3)

Educational activities:
Type of activities: practicals
Number of hours:
per week: 2 **per level/semester:** 26
Form of the course: on-site learning

Number of credits: 2

Recommended semester: 3.

Educational level: I., I.II., II.

Prerequisites:

Course requirements:
Scale of assessment (preliminary/final): 100/0

Learning outcomes:

Class syllabus:
The subject provides a course of intermediate French language, covering not only general, but also technical language.

Recommended literature:
Capelle Guy, Menand Robert: Le Nouveau taxi 1, Hachette FLE Paris, France 2009, ISBN 978-2-01-155548 - 9

Languages necessary to complete the course:

Notes:

Past grade distribution
Total number of evaluated students: 120

A	B	C	D	E	FX
45,83	25,83	18,33	5,83	0,83	3,33

Lecturers: Mgr. Ľubomíra Kožehubová

Last change: 20.06.2022

Approved by: prof. RNDr. Ján Filo, CSc.

COURSE DESCRIPTION

Academic year: 2025/2026

University: Comenius University Bratislava

Faculty: Faculty of Mathematics, Physics and Informatics

Course ID:	**Course title:**
FMFI.KJP/1-MXX-242/00	French Language (4)

Educational activities:
Type of activities: practicals
Number of hours:
per week: 2 **per level/semester:** 26
Form of the course: on-site learning

Number of credits: 2

Recommended semester: 4.

Educational level: I., I.II., II.

Prerequisites:

Course requirements:
Scale of assessment (preliminary/final): 100/0

Learning outcomes:

Class syllabus:
The subject provides a course of intermediate French covering not only general, but also technical French language.

Recommended literature:
Menand Robert: Le Nouveau taxi 2, Hachette FLE, Paris, France 2009, ISBN 978-2-01-155551 - 9

Languages necessary to complete the course:

Notes:

Past grade distribution
Total number of evaluated students: 79

A	B	C	D	E	FX
43,04	32,91	16,46	2,53	1,27	3,8

Lecturers: Mgr. Ľubomíra Kožehubová

Last change: 20.06.2022

Approved by: prof. RNDr. Ján Filo, CSc.

COURSE DESCRIPTION

Academic year: 2025/2026

University: Comenius University Bratislava

Faculty: Faculty of Mathematics, Physics and Informatics

Course ID:	**Course title:**
FMFI.KMANM/1-MAT-410/00	Functional Analysis (1)

Educational activities:
Type of activities: lecture / practicals
Number of hours:
per week: 2 / 2 **per level/semester:** 26 / 26
Form of the course: on-site learning

Number of credits: 5

Recommended semester: 5.

Educational level: I., II.

Prerequisites: FMFI.KMANM/1-MAT-250/22 - Mathematical Analysis (4) or FMFI.KMANM/1-MAT-250/14 - Mathematical Analysis (4) or FMFI.KMANM/2-MMN-103/22 - Ordinary Differential Equations

Recommended prerequisites:
Elements of differential and integral calculus

Course requirements:
Evaluation from exercises during semester: 2 written tests 20 points each, to pass to the final examination, minimum of 10 points from semester is required.
Final examination: oral
Indicative assessment scale: A 90%, B 80%, C 70%, D 60%, E 50%
Scale of assessment (preliminary/final): 40/60

Learning outcomes:
Introduction to linear functional analysis.

Class syllabus:
Linear normed spaces, linear functionals and operators, Hahn-Banach Theorem, dual operators, Banach spaces, Banach-Stienhaus Theorem, differences between finite-dimensional and infinite-dimensional spaces, weak convergence, reflexivity, Lebesgue integral, limit theorems, mesasures on product spaces, Fubini theorem, Lp-spaces, Hilbert spaces, theorem on orthogonal projections, Riesz Representation Theorem, Bessel inequality, Fourier coefficients, orthonormal bases, the space of continuous functions, Stone-Weierstrass Theorem, Arzeal-Ascoli Lemma, the dual space of C(I).

Recommended literature:
W. Rudin: Analýza v reálném a komplexním oboru, Academia, Praha, 1977.
A. N. Kolmogorov - S. V. Fomin: Základy teórie funkcí a funkcionální analýzy, 1975.
A. E. Taylor: Úvod do funkcionální analýzy, Academia, Praha, 1973.

Languages necessary to complete the course:

Notes:

Past grade distribution
Total number of evaluated students: 135

A	B	C	D	E	FX
34,81	19,26	17,04	14,07	10,37	4,44

Lecturers: prof. RNDr. Michal Fečkan, DrSc., Mgr. Július Pačuta, PhD.

Last change: 19.09.2022

Approved by: prof. RNDr. Ján Filo, CSc.

COURSE DESCRIPTION

Academic year: 2025/2026

University: Comenius University Bratislava

Faculty: Faculty of Mathematics, Physics and Informatics

Course ID:	**Course title:**
FMFI.KMANM/1-MAT-411/15	Functional Analysis (2)

Educational activities:
Type of activities: lecture / practicals
Number of hours:
per week: 2 / 2 **per level/semester:** 26 / 26
Form of the course: on-site learning

Number of credits: 5

Recommended semester: 6.

Educational level: I.

Prerequisites: FMFI.KMANM/1-MAT-410/00 - Functional Analysis (1)

Recommended prerequisites:
Recommended 1-MAT-410 Funkcionálna analýza (1)

Course requirements:
Evaluation from exercises during semester: 2 written tests 20 points each, to pass to the final examination, minimum of 10 points from semester is required.
Final examination: oral
Indicative assessment scale: A 90%, B 80%, C 70%, D 60%, E 50%
Scale of assessment (preliminary/final): 40/60

Learning outcomes:
Advanced course in linear functional analysis.

Class syllabus:
1. Integrable functional spaces.
2. Dual spaces.
3. Approximation theorems.
4. Compactness.
5. Convex sets.
6. Factor space.

Recommended literature:
Teória lineárnych operátorov v technických a prírodných vedách / Arch W. Naylor, George R. Sell ; preklad z angličtiny Jozef Dravecký, Peter Mederly. Bratislava : Alfa, 1981
Základy teorie funkcí a funkcionální analýzy / A. N. Kolmogorov, S. V. Fomin ; přeložili z ruštiny Vladimír Doležal, Zdeněk Tichý. Praha : Státní nakladatelství technické literatury, 1975
Introduction to functional analysis / Angus E. Taylor. New York : John Wiley, 1958

Languages necessary to complete the course:

Notes:

Past grade distribution Total number of evaluated students: 16					
A	B	C	D	E	FX
62,5	18,75	6,25	0,0	0,0	12,5
Lecturers: prof. RNDr. Michal Fečkan, DrSc., Mgr. Július Pačuta, PhD.					
Last change: 30.08.2022					
Approved by: prof. RNDr. Ján Filo, CSc.					

COURSE DESCRIPTION

Academic year: 2025/2026

University: Comenius University Bratislava

Faculty: Faculty of Mathematics, Physics and Informatics

Course ID:	**Course title:**
FMFI.KMANM/1-MAT-738/22	Functional Analysis Classes

Educational activities:
Type of activities: practicals
Number of hours:
per week: 1 **per level/semester:** 13
Form of the course: on-site learning

Number of credits: 1

Recommended semester: 5.

Educational level: I.

Prerequisites:

Recommended prerequisites:
FMFI.KMANM/1-MAT-250/14 - Mathematical analysis (4)

Course requirements:
Final evaluation based on the semestral evaluation from mandatory subject Functional analysis and attendance. 100 - 90 % A 89 - 80 % B 79 - 70 % C 69 - 55 % D 54 - 40 % E less than 40 % FX
Scale of assessment (preliminary/final): 100/0

Learning outcomes:
Introduction to linear functional analysis

Class syllabus:
Linear normed spaces, linear continuous functionals and operators, Hahn-Banach theorem, dual spaces, Banach spaces, Banach-Steinhaus theorem, differences between finite-dimensional and infinite-dimensional spaces. Reflexive spaces and weak convergence, Lp-spaces. Hilbert spaces, projection theorem, Riesz representation theorem, orthogonal systems, orthonormal basis.

Recommended literature:
Teória lineárnych operátorov v technických a prírodných vedách / Arch W. Naylor, George R. Sell ; preklad z angličtiny Jozef Dravecký, Peter Mederly. Bratislava : Alfa, 1981
Matematická analýza funkcií reálnej premennej / Marko Švec, Tibor Šalát, Tibor Neubrunn. Bratislava : Alfa, 1987
Základy teorie funkcí a funkcionální analýzy / A. N. Kolmogorov, S. V. Fomin ; přeložili z ruštiny Vladimír Doležal, Zdeněk Tichý. Praha : Státní nakladatelství technické literatury, 1975

Languages necessary to complete the course:
slovak, english

Notes:
It is recommended to pass the course along with 1-MAT_410 Functional analysis (1)

Past grade distribution Total number of evaluated students: 23					
A	B	C	D	E	FX
30,43	13,04	4,35	30,43	21,74	0,0
Lecturers: Mgr. Július Pačuta, PhD.					
Last change: 16.06.2022					
Approved by: prof. RNDr. Ján Filo, CSc.					

STATE EXAM DESCRIPTION

Academic year: 2025/2026	
University: Comenius University Bratislava	
Faculty: Faculty of Mathematics, Physics and Informatics	
Course ID: FMFI.KMANM/1-MAT-951/22	**Course title:** Fundamentals of Mathematics
Number of credits: 4	
Educational level: I.	
Learning outcomes: The result of successful completion of the state subject will be the completion of the state final examination in the subject Common Basics of Mathematics.	
Class syllabus: The course The common basis of mathematics consists of two parts: written and oral. The content of the exam corresponds to the composition of compulsory subjects of this study program. The graduate has theoretical knowledge of the study program and is able to solve a given problem.	
State exam syllabus:	
Last change: 16.03.2022	
Approved by: prof. RNDr. Ján Filo, CSc.	

COURSE DESCRIPTION

Academic year: 2025/2026

University: Comenius University Bratislava

Faculty: Faculty of Mathematics, Physics and Informatics

Course ID:	**Course title:**
FMFI.KTF/1-MAT-815/00	Fundamentals of Physics (1)

Educational activities:
Type of activities: lecture / practicals
Number of hours:
per week: 2 / 2 **per level/semester:** 26 / 26
Form of the course: on-site learning

Number of credits: 5

Recommended semester: 5.

Educational level: I.

Prerequisites: FMFI.KMANM/1-MAT-250/22 - Mathematical Analysis (4) or FMFI.KMANM/1-MAT-250/14 - Mathematical Analysis (4) or FMFI.KAMŠ/1-DAV-102/20 - Calculus (1) or FMFI.KMANM/1-INF-150/22 - Mathematical Analysis (2)

Recommended prerequisites:
1-MAT-150 Mathematical analysis (2) AND 1-MAT-160 Linear algebra and geometry (2)

Course requirements:
Semester grading based on homework.
Informative grading scale: A 90%, B 80%, C 70%, D 60%, E 50%
Scale of assessment (preliminary/final): 100/0

Learning outcomes:
The course will enable the students to understand the basic physics concepts, terminology and notation, as well as the importance and usage of these. They will be familiar with the most important physics approaches and problems, they will know how to solve these and will be able to interpret them. They will have the necessary skills to independently study the basic physics and technical literature. The first semester concentrates on topics from mechanics, however students will be able to understand problems from other areas of physics as well.

Class syllabus:
kinematics and dynamics of a point mass, Newton laws of motion, potential forces, harmonic oscillator, central potentials, collisions, two body problem a and many body problem, dynamics of collections of point masses, waves and oscillations, inertial and non-inertial reference frames, laws of motion in non-inertial reference frames, introduction to special theory of relativity; it is possible to include different topics according to needs and interests of the students

Recommended literature:
Feynmanovy přednášky z fyziky s řešenými příklady 1/3 / Richard P. Feynman, Robert B. Leighton, Matthew Sands. Havlíčkův Brod : Fragment, 2001
Lecture notes by the lecturer available at the website of the course.

Languages necessary to complete the course:
Slovak, English

Notes:

Past grade distribution
Total number of evaluated students: 81

A	B	C	D	E	FX
70,37	12,35	13,58	2,47	0,0	1,23

Lecturers: Mgr. Juraj Tekel, PhD.

Last change: 15.03.2022

Approved by: prof. RNDr. Ján Filo, CSc.

COURSE DESCRIPTION

Academic year: 2025/2026

University: Comenius University Bratislava

Faculty: Faculty of Mathematics, Physics and Informatics

Course ID:	**Course title:**
FMFI.KTF/1-MAT-825/00	Fundamentals of Physics (2)

Educational activities:
Type of activities: lecture / practicals
Number of hours:
per week: 2 / 1 **per level/semester:** 26 / 13
Form of the course: on-site learning

Number of credits: 4

Recommended semester: 6.

Educational level: I.

Prerequisites: FMFI.KTF/1-MAT-815/00 - Fundamentals of Physics (1) or FMFI.KAMŠ/1-DAV-112/20 - Calculus (2)

Recommended prerequisites:
1-MAT-815 Fundamentals of physics (1) AND 1-MAT-250 Mathematical analysis (4) AND 1-MAT-310 Ordinary differential equations (1)

Course requirements:
Semester grading based on homework.
Informative grading scale: A 90%, B 80%, C 70%, D 60%, E 50%
Scale of assessment (preliminary/final): 100/0

Learning outcomes:
The course will enable the students to understand and find their way in a wide range of various areas of physics. They will understand the basic concepts and terminology in these areas and will be familiar with the most important problems. They will have the necessary skills for independent study of more advanced literature, including research papers.

Class syllabus:
Lagrange formulation of classical mechanics, least action principle, selected topics from hydrodynamics, Euler and Navier-Stokes equations, electrostatics, electric currents, magnetism, Maxwell equations, scalar and vector potentials, theory of electromagnetic field and electrodynamics, quantum mechanics - formulation and most important results; it is possible to include different topics according to needs and interests of the students

Recommended literature:
Feynmanovy přednášky z fyziky s řešenými příklady 2/3 / Feynman, Leighton, Sands. Praha : Fragment, 2001
Lecture notes by the lecturer available at the website of the course.

Languages necessary to complete the course:
Slovak, English

Notes:

Past grade distribution Total number of evaluated students: 27					
A	B	C	D	E	FX
88,89	0,0	11,11	0,0	0,0	0,0
Lecturers: Mgr. Juraj Tekel, PhD.					
Last change: 15.03.2022					
Approved by: prof. RNDr. Ján Filo, CSc.					

COURSE DESCRIPTION

Academic year: 2025/2026

University: Comenius University Bratislava

Faculty: Faculty of Mathematics, Physics and Informatics

Course ID:	**Course title:**
FMFI.KAG/1-MAT-551/22	Geometry for Graphics (1)

Educational activities:
Type of activities: course
Number of hours:
per week: 4 **per level/semester:** 52
Form of the course: on-site learning

Number of credits: 5

Recommended semester: 5.

Educational level: I., II.

Prerequisites:

Course requirements:
Semestral work: Homeworks - 30% of the final grade
Final exam: Written and oral - 70% of the final grade
Student needs at least half of points from homeworks to be able to attend the final exam.
Indicative assessment scale: A 90%, B 80%, C 70%, D 60%, E 50%
Scale of assessment (preliminary/final): 30% homework/ 70% final exam

Learning outcomes:
By completing the course, students will supplement and expand the knowledge of geometry necessary for the study and understanding of the means and methods of computer graphics. They will master the analytical geometry in point-vector form, including the matrix variant. They will also master the theory and practice of parallel and central projections from 3D to 2D and basic 2D and 3D transformations.

Class syllabus:
Euclidean spaces. Point-vector calculus. Affine and Cartesian coordinates. Subspaces. Parallelism and perpendicularity. Coordinate transformations. Orientation. Halfspaces. Linear combination of points. Barycentric coordinates. Cross-ratio. Affine maps of Euclidean spaces. Homogenneous part of an affine map. Homothety and translations. Analytic form of an affine transformation in affine and extended affine coordinates. The matrix of an affine transformation. The module of an affine transformation. Parallel projection of 3-space to plane and its analytic form. Standard types of parallel projections and their matrix analytic forms. Similarities and isometries. Rotations in 2D and 3D. Classification of isometries in 2D and 3D

Recommended literature:
Analytická a diferenciální geometrie / Bruno Budinský. Praha : Státní nakladatelství technické literatury, 1983
Methods of geometry / James T. Smith. New York : John Wiley , 2000
Electronic study materials

Languages necessary to complete the course:
Slovak, English

Notes:					
Past grade distribution Total number of evaluated students: 524					
A	B	C	D	E	FX
21,37	14,5	19,08	20,04	17,37	7,63
Lecturers: Mgr. Ľudovít Balko, PhD., doc. RNDr. Pavel Chalmovianský, PhD.					
Last change: 22.06.2022					
Approved by: prof. RNDr. Ján Filo, CSc.					

COURSE DESCRIPTION

Academic year: 2025/2026

University: Comenius University Bratislava

Faculty: Faculty of Mathematics, Physics and Informatics

Course ID:	**Course title:**
FMFI.KAG/1-MAT-552/22	Geometry for Graphics (2)

Educational activities:
Type of activities: course
Number of hours:
per week: 2 **per level/semester:** 26
Form of the course: on-site learning

Number of credits: 3

Recommended semester: 6.

Educational level: I.

Prerequisites:

Course requirements:
Semestral work: Homeworks - 30% of the final grade
Final exam: Written and oral - 70% of the final grade
Student needs at least half of points from homeworks to be able to attend the final exam.
Indicative assessment scale: A 90%, B 80%, C 70%, D 60%, E 50%
Scale of assessment (preliminary/final): 30% homework/ 70% final exam

Learning outcomes:
The graduate of the subject will know the basic concepts and characteristics of curves in the Euclidean plane or in the three-dimensional Euclidean space and solution of elementary problems in the projective extension of an Euclidean space using homogeneous coordinates.

Class syllabus:
Point and vector functions of one real variable. Parametrized curves. Tangent and osculating plane, Frenet frame of a curve. Length of a curve and natural parametrization of curve. Curvature of a curve. Torsion of a curve. Natural equations of a curve. Contact of curves. Singular points of curves. The envelope of an oneparametric system of curves. The projective extension of an Euclidean space. Points at infinity. Homogeneous coordinates. Subspaces and their equations.

Recommended literature:
Erwin Kreyszig, Differential Geometry, Dover Publications, Inc, New York, 1991
M. do Carmo, Differential Geometry of Curves and Surfaces, Prentice Hall, New Yersey, 1976
Electronic materials

Languages necessary to complete the course:
Slovak, English

Notes:

Past grade distribution
Total number of evaluated students: 314

A	B	C	D	E	FX
23,25	11,78	16,24	20,7	26,11	1,91

Lecturers: Mgr. Ľudovít Balko, PhD., doc. RNDr. Pavel Chalmovianský, PhD.

Last change: 22.06.2022

Approved by: prof. RNDr. Ján Filo, CSc.

COURSE DESCRIPTION

Academic year: 2025/2026

University: Comenius University Bratislava

Faculty: Faculty of Mathematics, Physics and Informatics

Course ID:	**Course title:**
FMFI.KJP/1-MXX-151/00	German Language (1)

Educational activities:
Type of activities: practicals
Number of hours:
per week: 2 **per level/semester:** 26
Form of the course: on-site learning

Number of credits: 2

Recommended semester: 1.

Educational level: I., I.II., II.

Prerequisites:

Course requirements:
Scale of assessment (preliminary/final): 100/0

Learning outcomes:
To master the fundamentals of the common language and basic technical terms of particular fields of study (depending on the student's level of German proficiency)

Class syllabus:
German language is taught at three levels: beginner, intermediate and advanced. Students opt for one of them depending on whether they need to learn the fundamentals or maintain and/or improve their previous knowledge.
This course's focus is to master the fundamentals of the common language and basic technical terms of particular fields of study (depending on the student's level of German proficiency)

Recommended literature:
Appropriate study material is supplied by teacher based on the participants'level of German proficiency.

Languages necessary to complete the course:

Notes:

Past grade distribution
Total number of evaluated students: 828

A	B	C	D	E	FX
37,56	25,48	18,6	9,18	2,78	6,4

Lecturers: Mgr. Alexandra Maďarová, Mgr. Simona Dobiašová, PhD.

Last change: 21.06.2022

Approved by: prof. RNDr. Ján Filo, CSc.

COURSE DESCRIPTION

Academic year: 2025/2026

University: Comenius University Bratislava

Faculty: Faculty of Mathematics, Physics and Informatics

Course ID:	**Course title:**
FMFI.KJP/1-MXX-152/00	German Language (2)

Educational activities:
Type of activities: practicals
Number of hours:
per week: 2 **per level/semester:** 26
Form of the course: on-site learning

Number of credits: 2

Recommended semester: 2.

Educational level: I., I.II., II.

Prerequisites:

Course requirements:
Scale of assessment (preliminary/final): 100/0

Learning outcomes:
To master the fundamentals of the common language and basic technical terms of particular fields of study (depending on the student's level of German proficiency)

Class syllabus:
German language is taught at two levels: beginner and intermediate. Students opt for one of them depending on whether they wish to obtain the fundamentals of the language or wish to maintain and/or improve previous knowledge of German.
This course's focus is to to master the fundamentals of the common language and basic technical terms of particular fields of study (depending on the student's level of German proficiency)

Recommended literature:
Appropriate study material is supplied by teacher based on the participants'level of German proficiency

Languages necessary to complete the course:

Notes:

Past grade distribution
Total number of evaluated students: 541

A	B	C	D	E	FX
37,89	19,59	19,59	12,38	3,51	7,02

Lecturers: Mgr. Alexandra Maďarová, Mgr. Simona Dobiašová, PhD.

Last change: 21.06.2022

Approved by: prof. RNDr. Ján Filo, CSc.

COURSE DESCRIPTION

Academic year: 2025/2026

University: Comenius University Bratislava

Faculty: Faculty of Mathematics, Physics and Informatics

Course ID:	**Course title:**
FMFI.KJP/1-MXX-251/00	German Language (3)

Educational activities:
Type of activities: practicals
Number of hours:
per week: 2 **per level/semester:** 26
Form of the course: on-site learning

Number of credits: 2

Recommended semester: 3.

Educational level: I., I.II., II.

Prerequisites:

Course requirements:
Scale of assessment (preliminary/final): 100/0

Learning outcomes:
Master the basics of general language and basic professional terminology of individual fields of study (depending on the advanced level of students)

Class syllabus:
The course is a follow-up to the German language (1,2). The subject provides a course of intermediate or advanced German language.
This course's focus is to deepen the knowledge of the common language and basic technical terms of particular fields of study (depending on the student's level of German proficiency).

Recommended literature:
Appropriate study material is supplied by teacher based on the participants'level of German proficiency.

Languages necessary to complete the course:

Notes:

Past grade distribution
Total number of evaluated students: 184

A	B	C	D	E	FX
44,02	23,91	20,11	6,52	2,17	3,26

Lecturers: Mgr. Alexandra Maďarová, Mgr. Simona Dobiašová, PhD.

Last change: 21.06.2022

Approved by: prof. RNDr. Ján Filo, CSc.

COURSE DESCRIPTION

Academic year: 2025/2026

University: Comenius University Bratislava

Faculty: Faculty of Mathematics, Physics and Informatics

Course ID:	**Course title:**
FMFI.KJP/1-MXX-252/00	German Language (4)

Educational activities:
Type of activities: practicals
Number of hours:
per week: 2 **per level/semester:** 26
Form of the course: on-site learning

Number of credits: 2

Recommended semester: 4.

Educational level: I., I.II., II.

Prerequisites:

Course requirements:
Scale of assessment (preliminary/final): 100/0

Learning outcomes:
Master the basics of general language and basic professional terminology of individual fields of study (depending on the advanced level of students)

Class syllabus:
The course is a follow-up to the German language (1-3). It provides a course of intermediate and advanced German language.
This course's focus is to deepen the knowledge of the common language and basic technical terms of particular fields of study (depending on the student's level of German proficiency).

Recommended literature:
Appropriate study material is supplied by teacher based on the participants'level of German proficiency.

Languages necessary to complete the course:

Notes:

Past grade distribution
Total number of evaluated students: 104

A	B	C	D	E	FX
44,23	22,12	14,42	10,58	3,85	4,81

Lecturers: Mgr. Alexandra Maďarová, Mgr. Simona Dobiašová, PhD.

Last change: 21.06.2022

Approved by: prof. RNDr. Ján Filo, CSc.

COURSE DESCRIPTION

Academic year: 2025/2026

University: Comenius University Bratislava

Faculty: Faculty of Mathematics, Physics and Informatics

Course ID:	**Course title:**
FMFI.KAG/1-MAT-460/00	Graph Theory

Educational activities:
Type of activities: lecture
Number of hours:
per week: 2 **per level/semester:** 26
Form of the course: on-site learning

Number of credits: 3

Recommended semester: 5.

Educational level: I.

Prerequisites:

Course requirements:
Continuous evaluation: homewrok (20 p.)
Final exam: written (80 p.)
Grades: A 90%, B 80%, C 70%, D 60%, E 50%
Scale of assessment (preliminary/final): 20/80

Learning outcomes:
Understanding of an interplay of algebraic and discrete mathematical strucures, applications for solving concrete problems.

Class syllabus:
The automorphism group of a graph, constructions and properties of highly symmetric graphs. Symmetry and patterns, enumeration of patterns. Independent sest and cliques. Turan's theorem and extremal graphs, colorings of graphs and Ramsey's theorem. The probabilistic method, existence of a given structure, typical properties of graphs.

Recommended literature:
J. Plesník: Grafové algoritmy, Veda, Bratislava, 1983
J.A. Bandy, U.S.R. Murphy: Graph Theory with Applications, North-Holland, New York - Amsterdam - London, 1976

Languages necessary to complete the course:
slovak, english

Notes:

Past grade distribution
Total number of evaluated students: 72

A	B	C	D	E	FX
69,44	4,17	15,28	5,56	1,39	4,17

Lecturers: prof. RNDr. Róbert Jajcay, DrSc., doc. RNDr. Martin Mačaj, PhD.

Last change: 19.06.2022
Approved by: prof. RNDr. Ján Filo, CSc.

COURSE DESCRIPTION

Academic year: 2025/2026

University: Comenius University Bratislava

Faculty: Faculty of Mathematics, Physics and Informatics

Course ID:	**Course title:**
FMFI.KAG/1-MAT-755/23	Graph Theory

Educational activities:
Type of activities: lecture / practicals
Number of hours:
per week: 2 / 1 **per level/semester:** 26 / 13
Form of the course: on-site learning

Number of credits: 4

Recommended semester: 3.

Educational level: I.

Prerequisites:

Antirequisites: FMFI.KAG/1-MAT-755/15

Course requirements:
Ongoing evaluation: homeworks
Exam: combined
Indicative evaluation scale: A 90%, B 80%, C 70%, D 60%, E 50%
Scale of assessment (preliminary/final): 20/80

Learning outcomes:
Graduates will understand significant results in the field of graph theory. They will be aware of the deeper connections and relationships between different areas of graph theory.

Class syllabus:
Basic terms and definitions, blocks, bridges and articulation, trees and spanning trees, pairings in bipartite graphs, Hall and Konig theorem, pairings in general graphs, Tutte's theorem, vertex and edge connectivity, Menger's theorem, plane graphs, Kuratowski's theorem. Linear algebra in graph theory

Recommended literature:
Graph theory / Reinhard Diestel. Berlin : Springer, 2005

Languages necessary to complete the course:

Notes:

Past grade distribution
Total number of evaluated students: 45

A	B	C	D	E	FX
55,56	4,44	8,89	4,44	17,78	8,89

Lecturers: doc. RNDr. Martin Mačaj, PhD.

Last change: 23.05.2023

Approved by: prof. RNDr. Ján Filo, CSc.

COURSE DESCRIPTION

Academic year: 2025/2026

University: Comenius University Bratislava

Faculty: Faculty of Mathematics, Physics and Informatics

Course ID:	**Course title:**
FMFI.KAI/1-MXX-491/22	Inclusive Approaches to Education of Students with Special Educational Needs

Educational activities:
Type of activities: seminar
Number of hours:
per week: 2 **per level/semester:** 26
Form of the course: on-site learning

Number of credits: 2

Recommended semester: 1., 3.

Educational level: I., I.II.

Prerequisites:

Course requirements:
Continuous assessment: active participation in class (elaboration of assigned tasks, participation in discussions)
An exam: -
Indicative assessment level: e.g. A 90%, B 80%, C 70%, D 60%, E 50%
Scale of assessment (preliminary/final): 100/0

Learning outcomes:
The student:
- They will get acquainted with the basic characteristics of types of health disadvantage (HR) and will know the consequences of HR on education.
- Gain personal experience from meetings with people with disabilities and will be able to explain and apply the rules of communication with them.
- Can characterize the forms of education of students with SEN and assess the possibilities of their pedagogical, technical and human support, which positively affect the success of education.

Class syllabus:
- Characteristics of basic concepts.
- Disability models.
- Disability legislation.
- Human, communication, information and architectural barriers.
- Impact of disability on education.
- Segregation - integration - inclusion.
- Information access technologies for people with disabilities.
- Possibilities and limits of creating equal conditions for the education of pupils with specific educational needs.
- Inclusive school - education for all.
- The importance of education for the social inclusion of people with disabilities.

Recommended literature:

- Lechta, V. (ed): Inkluzivní pedagogika. Praha: Portál, 2016, ISBN 978-80-262-1123-5
- Slowík, J.: Komunikace s lidmi a postižením. Praha: Portál, 2010, ISBN 978-80-7367-691-9
- Kol. autorov: Od integrácie k inklúzii. VÚDPaP: Bratislava, 2018, ISBN 978-80-89698-27-1

Languages necessary to complete the course:
Slovak

Notes:

Past grade distribution
Total number of evaluated students: 105

A	B	C	D	E	FX
74,29	20,0	3,81	0,0	0,0	1,9

Lecturers: Mgr. Ľudmila Hlinová

Last change: 15.03.2022

Approved by: prof. RNDr. Ján Filo, CSc.

COURSE DESCRIPTION

Academic year: 2025/2026

University: Comenius University Bratislava

Faculty: Faculty of Mathematics, Physics and Informatics

Course ID:	**Course title:**
FMFI.KAG/1-MAT-495/00	Introduction to Coding Theory

Educational activities:
Type of activities: lecture
Number of hours:
per week: 2 **per level/semester:** 26
Form of the course: on-site learning

Number of credits: 3

Recommended semester: 6.

Educational level: I.

Prerequisites:

Recommended prerequisites:
1-MAT-260 Algebra (2)

Course requirements:
Ongoing evaluation during the semester: homeworks, midterm
Final exam: written and oral
Approximative grade scale: A 90%, B 80%, C 70%, D 60%, E 50%
Scale of assessment (preliminary/final): 50/50

Learning outcomes:
After completing the course, students will understand fundamental theoretical and practical aspects of coding theory, data transmission in a noisy channel as well as the basic principles of protecting data against errors introduced in transmission or storage.

Class syllabus:
Introduction to Coding Theory and Cryptography. Coding theory for the "ideal" communication channel (definitions and examples, concepts of encoding and decoding, construction of some simple codes, the shortest code, block codes etc.) Introduction to the theory of error-correcting codes (the minimum distance of a nontrivial code, detection and correction of transmitted errors, information symbols and parity check symbols).
Introduction to the theory of linear codes. (generator matrix and parity check matrix).

Recommended literature:
Introduction to coding theory / Jacobus Hendricus van Lint. Berlin : Springer, 1999
J. Adámek: Coding theory, SNTL, Praha 1989 (in Czech)
Paul Garrett, The Mathematics of Coding Theory, Pearson Prentice Hall
Raymond Hill, A First Course in Coding Theory, Oxford
Steven Roman, Coding and Information Theory, Springer

Languages necessary to complete the course:
Slovak, English

Notes:

Past grade distribution Total number of evaluated students: 118					
A	B	C	D	E	FX
77,97	6,78	5,08	1,69	2,54	5,93
Lecturers: prof. RNDr. Róbert Jajcay, DrSc.					
Last change: 14.03.2022					
Approved by: prof. RNDr. Ján Filo, CSc.					

COURSE DESCRIPTION

Academic year: 2025/2026

University: Comenius University Bratislava

Faculty: Faculty of Mathematics, Physics and Informatics

Course ID:	**Course title:**
FMFI.KAG/1-MAT-180/00	Introduction to Computer Graphics

Educational activities:
Type of activities: lecture / practicals
Number of hours:
per week: 2 / 2 **per level/semester:** 26 / 26
Form of the course: on-site learning

Number of credits: 5

Recommended semester: 2.

Educational level: I.

Prerequisites:

Recommended prerequisites:
None.

Course requirements:
For the semester, the student can get 50% for exercises, 20% for midterm and the final written exam has a weight of 30%. The student must obtain at least half of the points for the exercises as well as for the project in order to pass the final written exam. Grading: A (100-91), B (90-81), C (80-71), D (70-61), E (60-51), Fx (50-0).
Scale of assessment (preliminary/final): Weight of midterm / final assessment: Mid-term assessment 20% (midterm) / + 50% project 30% final exam.

Learning outcomes:
Students will gain knowledge about algorithmic solutions to basic computer graphics problems. They will learn the methodology of working on the creation of a graphics system and the use of algorithms in terms of efficiency, time and memory requirements. They will acquire knowledge and skills in modeling and displaying graphic objects and static scenes.

Class syllabus:
Computer graphics definition and reference model. History, fundamental problems and their solutions. Transformations in the plane. Basics of functional specification of graphic systems and standards. Graphical objects creation, modification, and coding. Rasterisation. Clipping and intersections. Fundamental image processing algorithms.

Recommended literature:
Ružický, E. a kol. Počítačová grafika a spracovanie obrazu. Bratislava: Sapientia 1995.
Počítačová grafika a spracovanie obrazu / Eugen Ružický, Andrej Ferko. Bratislava : Sapientia, 1995
Moderní počítačová grafika / Jiří Žára, Bedřich Beneš, Petr Felkel. Praha : Computer Press, 1998
Fundamentals of interactive computer graphics / James D. Foley, Andries van Dam. Reading : Addison-Wesley, 1983
Supporting digital texts available from the class website.

Languages necessary to complete the course:
English, Slovak

Notes:
The class is eventually taught in a distant mode.

Past grade distribution
Total number of evaluated students: 810

A	B	C	D	E	FX
34,57	30,12	15,68	8,02	2,96	8,64

Lecturers: doc. RNDr. Andrej Ferko, PhD.

Last change: 22.06.2022

Approved by: prof. RNDr. Ján Filo, CSc.

COURSE DESCRIPTION

Academic year: 2025/2026

University: Comenius University Bratislava

Faculty: Faculty of Mathematics, Physics and Informatics

Course ID:	**Course title:**
FMFI.KAG/1-AIN-545/22	Introduction to geometric modeling

Educational activities:
Type of activities: course
Number of hours:
per week: 4 **per level/semester:** 52
Form of the course: on-site learning

Number of credits: 4

Recommended semester: 6.

Educational level: I.

Prerequisites:

Course requirements:
For the semester, the student can get 50% for exercises and 50% for the final exam. The student must obtain at least half of the points for the exercises in order to pass to the final exam. During the semester, the student can obtain 37.50% for programming assignments and 12.5% for written homework assignments, there is no minimal requirement for homework assignments.
The final exam consists of a written (40%) and an oral part (10%). If the student does not get half of the points for the written part of the final exam, he / she is not admitted to the oral part and the grade is Fx. Upon successful completion of the written part of the exam, participation in the oral part of the final exam is voluntary.
Grading: A (100-91), B (90-81), C (80-71), D (70-61), E (60-51), Fx (50-0).
Scale of assessment (preliminary/final): Preliminary assessment 50% (37.50% programming assignments + 12.5% written homework assignments) / 50% final exam (40% written part + 10% oral part).

Learning outcomes:
The course graduate gains basic knowledge of the cubic curve segments, spline curves, patches and spline surfaces. Spline curves and surfaces are studied with parametric or geometric continuities, the shape parameters are applied for modeling. The computational algorithms of the curve segments are presented.

Class syllabus:
1. Representation of cubic segments in Hermite and Bernstein basis, computational algorithms.
2. Geometric and parametric continuities for curve segments and creating:
a) interpolating splines (Hermite spline, cardinal spline, Catmull-Rom spline)
b) approximating splines (Bézier spline, Beta spline, B-spline).
Rational curves (Bézier, NURBS) and the weights as shape parameters.
3. Representation of surfaces defined by
a) geometric transformation (surfaces of revolution)
b) boundary curves (ruled surfaces, Coons surfaces)
c) control nets (tensor-product surfaces, Bézier, B-spline, NURBS).

Recommended literature:

Geometric Modeling with Splines / R. F. Riesenfeld, E. Cohen, G. Elber: A K Peters/CRC Press; 1 ed. 2001
Fundamentals of CAGD / J. Hoschek, D. Lasser: A K Peters/CRC Press; 1 ed., 1996
Geometric Concepts for Geometric Design / W. Boehm, H. Prautzsch. Publ. by A K PETERS, 1993
Bézier and B-Spline Techniques / H. Prautzsch, W. Boehm, M. Paluszny. Springer-Verlag Berlin Heidelberg, 2002
Curves and Surfaces for CAGD, Fifth Edition: A Practical Guide / Gerald Farin. Morgan-Kaufmann, 2002

Languages necessary to complete the course:
english

Notes:

Past grade distribution
Total number of evaluated students: 89

A	B	C	D	E	FX
16,85	15,73	13,48	25,84	15,73	12,36

Lecturers: RNDr. Martina Bátorová, PhD., Mgr. Marcel Makovník, PhD.

Last change: 20.06.2022

Approved by: prof. RNDr. Ján Filo, CSc.

COURSE DESCRIPTION

Academic year: 2025/2026

University: Comenius University Bratislava

Faculty: Faculty of Mathematics, Physics and Informatics

Course ID:	**Course title:**
FMFI.KAI/1-AIN-406/22	Language and Cognition

Educational activities:
Type of activities: course
Number of hours:
per week: 2 **per level/semester:** 26
Form of the course: on-site learning

Number of credits: 3

Recommended semester: 2., 4., 6.

Educational level: I., I.II.

Prerequisites:

Course requirements:
Continuous assessment: presentations, bonus assignments
Indicative assessment scale: A 90%, B 80%, C 70%, D 60%, E 50%
Scale of assessment (preliminary/final): 100/0

Learning outcomes:
Acquisition of the most important current theories and methods of studying natural language and cognitive processes.

Class syllabus:
The course focuses on the most important aspects of natural language research (the most complex cognitive function): basic properties of language (arbitrariness, generative productivity, dynamism, structuring at many levels), mechanisms of speech production and perception, language acquisition, innate and acquired factors of language development.

Recommended literature:
G. Dorren: Babel. Around the World in 20 Languages. Profile Books, 2019
S. Pinker: Language Instinct. ſBrilliance Audio, 2014
S. Pinker: The Stuff of Thought. Language as a Window Into Human Nature. Penguin Books 2008
S. Pinker: Words and Rules. The lngredients of Language. Basic Books 2015

Languages necessary to complete the course:
Slovak, English

Notes:

Past grade distribution
Total number of evaluated students: 172

A	B	C	D	E	FX
37,21	23,84	15,12	11,05	5,23	7,56

Lecturers: doc. PhDr. Ján Rybár, PhD.

Last change: 17.05.2024
Approved by: prof. RNDr. Ján Filo, CSc.

COURSE DESCRIPTION

Academic year: 2025/2026

University: Comenius University Bratislava

Faculty: Faculty of Mathematics, Physics and Informatics

Course ID:	**Course title:**
FMFI.KAG/1-MAT-120/15	Linear Algebra and Geometry (1)

Educational activities:
Type of activities: lecture / practicals
Number of hours:
per week: 4 / 2 **per level/semester:** 52 / 26
Form of the course: on-site learning

Number of credits: 8

Recommended semester: 1.

Educational level: I.

Prerequisites:

Course requirements:
Continuous assessment: 2 tests and 2 presentations at tutorials (together 30% of the overall mark), the student has to have at least mark E to be admitted to the exam
Exam: a test and an oral exam (35% and 35% of overall mark)
Indicative assessment scale: A 90%, B 80%, C 70%, D 60%, E 50%
Scale of assessment (preliminary/final): 30/70

Learning outcomes:
Students will acquire practical skills in solving and in qualitative analysis of systems of linear equations; they will master the basics of the theory of vector spaces and linear maps.
Students will improve in proving mathematical statements and deriving properties of mathematical objects, they will advance in the ability to argue in the language and style of university mathematics.

Class syllabus:
Number systems. Functions. Groups, rings and fields. Vector spaces. Gaussian elimination method for solving systems of linear equations. Matrices and linear maps. Solvability of a system of linear equations and the structure of the set of its solutions. Determinants and their use. Euclidean vector spaces. Orthogonal projection onto a subspace of a Euclidean vector space.

Recommended literature:
Prednášky z lineárnej algebry a geometrie / Július Korbaš, Štefan Gyurki. Vydavateľstvo UK, Bratislava, 2013
Lineárna algebra a geometria : Cesta z troch rozmerov s presahmi do príbuzných odborov / Pavol Zlatoš. Bratislava : Albert Marenčin, 2011; electronic version available at http://thales.doa.fmph.uniba.sk/zlatos/la/LAG_A4.pdf

Languages necessary to complete the course:
Slovak, English

Notes:

Past grade distribution Total number of evaluated students: 235					
A	B	C	D	E	FX
20,0	16,17	17,45	17,87	16,6	11,91
Lecturers: doc. Mgr. Tibor Macko, PhD.					
Last change: 21.06.2022					
Approved by: prof. RNDr. Ján Filo, CSc.					

COURSE DESCRIPTION

Academic year: 2025/2026

University: Comenius University Bratislava

Faculty: Faculty of Mathematics, Physics and Informatics

Course ID:	**Course title:**
FMFI.KAG/1-MAT-160/15	Linear Algebra and Geometry (2)

Educational activities:
Type of activities: lecture / practicals
Number of hours:
per week: 4 / 2 **per level/semester:** 52 / 26
Form of the course: on-site learning

Number of credits: 8

Recommended semester: 2.

Educational level: I.

Prerequisites: FMFI.KAG/1-MAT-120/15 - Linear Algebra and Geometry (1)

Course requirements:
Continuous assessment: 2 tests and 2 presentations at tutorials (together 30% of the overall mark), the student has to have at least mark E to be admitted to the exam
Exam: a test and an oral exam (35% and 35% of overall mark)
Indicative assessment scale: A 90%, B 80%, C 70%, D 60%, E 50%
Scale of assessment (preliminary/final): 30/70

Learning outcomes:
Students will learn the basics of affine geometry, respectively affine-euclidean spaces, deepen and expand knowledge about linear maps (transformations), master the basics of the theory of quadratic forms and their geometric applications and the basics of multilinear algebra.
Students will improve in proving mathematical statements and deriving properties of mathematical objects, they will be able to argue in the language and style of university mathematics.

Class syllabus:
Affine spaces and affine subspaces (linear varieties); orientation. Afinne-Euclidean space. Vector product and triple product of vectors; applications. Linear transformations. Eigenvalues and eigenvectors. Bilinear and quadratic forms. Second order curves; applications of the theory of quadratic forms. Dual vector space. Tensor product of vector spaces.

Recommended literature:
Prednášky z lineárnej algebry a geometrie / Július Korbaš, Štefan Gyurki. Vydavateľstvo UK, Bratislava, 2013
Lineárna algebra a geometria : Cesta z troch rozmerov s presahmi do príbuzných odborov / Pavol Zlatoš. Bratislava : Albert Marenčin, 2011; elektronická verzia dostupná na http://thales.doa.fmph.uniba.sk/zlatos/la/LAG_A4.pdf

Languages necessary to complete the course:
Slovak, English

Notes:

Past grade distribution Total number of evaluated students: 204					
A	B	C	D	E	FX
26,47	20,1	12,25	18,63	14,71	7,84
Lecturers: RNDr. Martin Sleziak, PhD., doc. Mgr. Tibor Macko, PhD.					
Last change: 21.06.2022					
Approved by: prof. RNDr. Ján Filo, CSc.					

COURSE DESCRIPTION

Academic year: 2025/2026

University: Comenius University Bratislava

Faculty: Faculty of Mathematics, Physics and Informatics

Course ID:	**Course title:**
FMFI.KAG/1-MAT-191/00	Linear Algebra and Geometry Classes (1)

Educational activities:
Type of activities: practicals
Number of hours:
per week: 2 **per level/semester:** 26
Form of the course: on-site learning

Number of credits: 2

Recommended semester: 1.

Educational level: I.

Prerequisites:

Course requirements:
Homework assignments
Grading: A 90%, B 80%, C 70%, D 60%, E 50%, Fx < 50%
Scale of assessment (preliminary/final): Semester 100% (homework assignments)

Learning outcomes:
The students will acquire practical skills in various computations related to the topics of the course Linear Algebra and Geometry (1).
Discussion of problems will improve their ability to analyze problems and build coherent arguments. The students will gain better insight into why various algorithms lead to the desired results. They will also understand the limitations of these algorithms.

Class syllabus:
Topics corresponding to the individual interests of students, within the following framework: Number systems (integers, rational numbers, real numbers, complex numbers), mappings, groups, rings, fields, vector spaces, the Gaussian elimination method for solving systems of linear equations, matrices and linear mappings, solvability of a system of linear equations and structure of the solution set, determinants and their applications, Euclidean vector spaces, orthogonal projection to a subspace.

Recommended literature:
J. Korbaš: Lineárna algebra a geometria I. Univerzita Komenského, Bratislava 2003.
T. Katriňák, M. Gavalec, E. Gedeonová, J. Smítal: Algebra a teoretická aritmetika 1. Univerzita Komenského, Bratislava 1999.
G. Birkhoff, S. MacLane: Prehľad modernej algebry. Alfa, Bratislava 1979.
P. Kaprálik, J. Tvarožek: Zbierka riešených príkladov a úloh z lineárnej algebry a analytickej geometrie. ALFA,
Bratislava 1987.
A. K. Faddejev, J. S. Sominskij: Zbierka úloh z vyššej algebry. Alfa, Bratislava 1968.
A. I. Kostrikin, Yu. I. Manin: Linear Algebra and Geometry. Gordon & Breach, New York 1989.
I. V. Proskurjakov: Problems in Linear Algebra. Mir, Moscow 1978.

Languages necessary to complete the course:

Notes:

Past grade distribution
Total number of evaluated students: 608

A	B	C	D	E	FX
31,58	19,41	17,76	15,95	10,36	4,93

Lecturers: RNDr. Martin Sleziak, PhD., doc. Mgr. Tibor Macko, PhD.

Last change: 18.06.2022

Approved by: prof. RNDr. Ján Filo, CSc.

COURSE DESCRIPTION

Academic year: 2025/2026

University: Comenius University Bratislava

Faculty: Faculty of Mathematics, Physics and Informatics

Course ID:	**Course title:**
FMFI.KAG/1-MAT-192/00	Linear Algebra and Geometry Classes (2)

Educational activities:
Type of activities: practicals
Number of hours:
per week: 2 **per level/semester:** 26
Form of the course: on-site learning

Number of credits: 2

Recommended semester: 2.

Educational level: I.

Prerequisites:

Course requirements:
Homework assignments
Grading: A 90%, B 80%, C 70%, D 60%, E 50%, Fx < 50%
Scale of assessment (preliminary/final): Semester 100% (homework assignments)

Learning outcomes:
The students will acquire practical skills in various computations related to the topics of the course Linear Algebra and Geometry (2).
Discussion of problems will improve their ability to analyze problems and build coherent arguments. The students will be able to apply the standard computational algorithms and they will improve their geometric intuition.

Class syllabus:
Topics corresponding to the individual interests of students, within the following framework: Affine spaces and subspaces. Orientation. Affine spaces with an inner product. Vector product and mixed product and their applications. Selected facts on polynomials. Linear transformations (eigenvalues, eigenvectors, diagonalization, Jordan normal form). Bilinear and quadratic forms. Plane curves of the second order; applications of the theory of quadratic forms. Dual vector spaces. Multilinear forms. Tensors.

Recommended literature:
M. Hejný, V. Zaťko, P. Kršňák: Geometria 1. SPN, Bratislava 1985.
T. Katriňák, M. Gavalec, E. Gedeonová, J. Smítal: Algebra a teoretická aritmetika 1. Univerzita Komenského, Bratislava 1999.
P. Kaprálik, J. Tvarožek: Zbierka riešených príkladov a úloh z lineárnej algebry a analytickej geometrie. ALFA,
Bratislava 1987.
A. I. Kostrikin, Yu.I.Manin: Linear Algebra and Geometry. Gordon & Breach, New York 1989.
G. Birkhoff, S. MacLane: Prehľad modernej algebry. Alfa, Bratislava 1979.
I. V. Proskurjakov: Problems in Linear Algebra. Mir, Moscow 1978.

Languages necessary to complete the course:

Notes:

Past grade distribution
Total number of evaluated students: 535

A	B	C	D	E	FX
34,58	17,38	16,07	15,14	12,52	4,3

Lecturers: doc. Mgr. Tibor Macko, PhD., doc. RNDr. Martin Mačaj, PhD.

Last change: 21.06.2022

Approved by: prof. RNDr. Ján Filo, CSc.

COURSE DESCRIPTION

Academic year: 2025/2026

University: Comenius University Bratislava

Faculty: Faculty of Mathematics, Physics and Informatics

Course ID:	**Course title:**
FMFI.KMANM/1-MAT-466/10	Linear Programming

Educational activities:
Type of activities: lecture / practicals
Number of hours:
per week: 2 / 2 **per level/semester:** 26 / 26
Form of the course: on-site learning

Number of credits: 5

Recommended semester: 5.

Educational level: I.

Prerequisites: FMFI.KAG/1-MAT-160/15 - Linear Algebra and Geometry (2) and FMFI.KMANM/1-MAT-150/00 - Mathematical Analysis (2)

Course requirements:
Continuous assessment: exercises: 20%, project: 20%, Exam: 60%.
The student must obtain at least half of the points for the exercises in order to pass the final written exam.
Grading: A (100-91), B (90-81), C (80-71), D (70-61), E (60-51), Fx (50-0).
Scale of assessment (preliminary/final): 40% / 60%

Learning outcomes:
Students master the basics of linear programming (simple models of real problems, relevant geometry, duality theory and some simplex methods, the idea of interior point methods). They are able to prove the statements. At the same time, they will gain an overview of possible applications of linear programming in other scientific fields, or in practice.

Class syllabus:
Geometric approach to solving linear programming problems. Practical problems formulation in the form of LP. Fundamentals of convex analysis (convex set, polyhedrons, extreme points, separation theorems, theorems of alternatives). Basic solutions and connection with extreme points. Simplex method (basic idea, two-phase and dual simplex method). Duality theory (duality and complementarity theorems) and its applications and economic interpretation. basic idea of interior point methods for linear programming, central path. Modern applications of linear programming.

Recommended literature:
Mária Trnovská: Lineárne programovanie, online text.
Lineárne programovanie / Ján Plesník, Jitka Dupačová, Milan Vlach. Bratislava : Alfa, 1990
Robert J. Vanderbei: Linear programming: Foundations and extensions, Kluwer Academic Publishers, 2000.

Languages necessary to complete the course:
Slovak, English

Notes:

Past grade distribution
Total number of evaluated students: 84

A	B	C	D	E	FX
33,33	13,1	26,19	13,1	9,52	4,76

Lecturers: doc. RNDr. Mária Trnovská, PhD., RNDr. Patrik Mihala, PhD., Mgr. Tomáš Rusin, PhD.

Last change: 14.07.2025

Approved by: prof. RNDr. Ján Filo, CSc.

COURSE DESCRIPTION

Academic year: 2025/2026

University: Comenius University Bratislava

Faculty: Faculty of Mathematics, Physics and Informatics

Course ID:	**Course title:**
FMFI.KMANM/1-MAT-110/00	Mathematical Analysis (1)

Educational activities:
Type of activities: lecture / practicals
Number of hours:
per week: 4 / 2 **per level/semester:** 52 / 26
Form of the course: on-site learning

Number of credits: 8

Recommended semester: 1.

Educational level: I.

Prerequisites:

Course requirements:
For the semester, the student can get 15 points for exercises, 40 points for written exams, the final written exam has a weight of 30 points, the final oral exam weighs 15 points. The student must obtain at least 45 points from the exercises, written exams and the final written exam, at least 15 points from the final written exam and at least 5 points from the final oral exam. Grading: A (91-100 points), B (81-90 points), C (71-80 points), D (61-70 points), E (51-60 points), Fx (0-50 points).
Weight of the ongoing / final assessment: ongoing assessment 55% (15% exercise + 40% written exams) / 45% (30% final written exam, 15% final oral exam).
Scale of assessment (preliminary/final): 55/45

Learning outcomes:
After completing the course, the student can use the apparatus of differential calculus of functions of one real variable in solving appropriate problems of theoretical and practical focus.

Class syllabus:
Real numbers, functions of real variables. Limit of the function, basic theorems on limits. Compact sets. Continuity of a function in a point and on a set, basic properties of continuous functions on intervalas and compact sets. Derivative and general rules for differentiation. Repeated differentiation. Mean value theorems. Applications of the derivative. L´Hospital´s rule. Taylor´s polynomials.

Recommended literature:
Rudin, Walter: Principles of mathematical analysis, ISBN 0-07-054235-X
Hildebrandt, Stefan: Analysis I, ISBN 3-540-42838-0
Forstter, Otto: Analysis I, ISBN 3-528-57224-8
Neubrunn, Tibor a Vencko, Jozef: Mathematical Analysis I, textbook of FMFI UK
Kubáček, Valášek: Cvičenia z Matematickej analýzy 1,2

Languages necessary to complete the course:
Slovak, English

Notes:

Past grade distribution
Total number of evaluated students: 999

A	B	C	D	E	FX
9,51	9,51	12,61	25,03	30,13	13,21

Lecturers: doc. RNDr. Zbyněk Kubáček, CSc., Mgr. Michaela Vargová, PhD., Mgr. Július Pačuta, PhD., Mgr. Jana Havlíčková, PhD.

Last change: 24.06.2022

Approved by: prof. RNDr. Ján Filo, CSc.

COURSE DESCRIPTION

Academic year: 2025/2026

University: Comenius University Bratislava

Faculty: Faculty of Mathematics, Physics and Informatics

Course ID:	**Course title:**
FMFI.KMANM/1-MAT-150/00	Mathematical Analysis (2)

Educational activities:
Type of activities: lecture / practicals
Number of hours:
per week: 4 / 2 **per level/semester:** 52 / 26
Form of the course: on-site learning

Number of credits: 8

Recommended semester: 2.

Educational level: I.

Prerequisites: FMFI.KMANM/1-MAT-110/00 - Mathematical Analysis (1)

Course requirements:
For the semester, the student can get 15 points for exercises, 40 points for written exams, the final written exam has a weight of 30 points, the final oral exam weighs 15 points. The student must obtain at least 45 points from the exercises, written exams and the final written exam, at least 15 points from the final written exam and at least 5 points from the final oral exam. Grading: A (91-100 points), B (81-90 points), C (71-80 points), D (61-70 points), E (51-60 points), Fx (0-50 points).
Weight of the ongoing / final assessment: ongoing assessment 55% (15% exercise + 40% written exams) / 45% (30% final written exam, 15% final oral exam).
Scale of assessment (preliminary/final): 55/45

Learning outcomes:
After completing the course, students will be able to use the apparatus of integral calculus of functions of one real variable, series and series of functions to solve appropriate computational and theoretical problems.

Class syllabus:
Antiderivatives and indefinite integrals and techniques of integration. The definite integral and its properties. Integral as a limit of integral sums. Derivatives with variable endpoints. The fundamental theorem. Mean value theorems. Applications of the integral. Series of positive terms. Absolutely and conditionally convergent series. Series of functions. Pointwise and uniform convergence. Power series. Taylor series.

Recommended literature:
Rudin, Walter: Principles of mathematical analysis, ISBN 0-07-054235-X
Hildebrandt, Stefan: Analysis I, ISBN 3-540-42838-0
Forstter, Otto: Analysis I, ISBN 3-528-57224-8
Neubrunn, Tibor a Vencko, Jozef: Mathematical Analysis I, textbook of FMFI UK
Kubáček, Valášek: Cvičenia z Matematickej analýzy 1,2, textbook of FMFI UK

Languages necessary to complete the course:

Notes:

Past grade distribution
Total number of evaluated students: 852

A	B	C	D	E	FX
13,5	10,33	18,31	26,76	27,7	3,4

Lecturers: doc. RNDr. Zbyněk Kubáček, CSc., Mgr. Michaela Vargová, PhD., PaedDr. Peter Vankúš, PhD.

Last change: 24.06.2022

Approved by: prof. RNDr. Ján Filo, CSc.

COURSE DESCRIPTION

Academic year: 2025/2026

University: Comenius University Bratislava

Faculty: Faculty of Mathematics, Physics and Informatics

Course ID:	**Course title:**
FMFI.KMANM/1-MAT-210/22	Mathematical Analysis (3)

Educational activities:
Type of activities: lecture / practicals
Number of hours:
per week: 4 / 2 **per level/semester:** 52 / 26
Form of the course: on-site learning

Number of credits: 8

Recommended semester: 3.

Educational level: I., II.

Prerequisites: (FMFI.KMANM/1-MAT-150/00 - Mathematical Analysis (2) and (FMFI.KAG/1-MMN-160/22 - Linear Algebra and Geometry (2) or FMFI.KAG/1-MAT-160/15 - Linear Algebra and Geometry (2))) or FMFI.KMANM/1-INF-150/22 - Mathematical Analysis (2) or FMFI.KMANM/1-MMN-150/15 - Mathematical Analysis (2) or FMFI.KMANM/1-INF-150/00 - Mathematical Analysis (2)

Course requirements:
For the semester, the student can get 20 points for exercises, 30 points for written exams, the final written exam has a weight of 30 points, the final oral exam weighs 20 points. The student must obtain at least 40 points from the exercises, written exams and the final written exam, at least 15 points from the final written exam and at least 10 points from the final oral exam. Grading: A (91-100 points), B (81-90 points), C (71-80 points), D (61-70 points), E (51-60 points), Fx (0-50 points).
Weight of the ongoing / final assessment: ongoing assessment 50% (20% exercise + 30% written exams) / 50% (30% final written exam, 20% final oral exam).
Scale of assessment (preliminary/final): 50/50

Learning outcomes:
Absolvent of the subject has basic knowledge of metric spaces and differential calculus of scalar and vector functions of several variables and is capable of applying it for solving particular tasks in differential calculus of functions of several variables.

Class syllabus:
1. Metric spaces
n-dimensional Euclidean space Rn, convergence and Cauchy sequence in Rn, metric spaces, convergence in a metric space, complete metric space, normed space, Banach space, Banach fixed point theorem, topology of metric spaces, compact and convex sets, convex functions
2. Limit and continuity
limit and continuity in metric spaces, continuous vector functions, continuity and compactness
3. Differential calculus of functions of several variables
partial derivatives, gradient, total differential and differentiability, derivative of a compound function, directional derivative, Taylor theorem and local extrema

4. Implicitly given functions
implicit function theorem, constrained extrema, Lagrange multipliers

Recommended literature:
J. Filo, K. Rostás: 2^2 × 13 prednášok z matematickej analýzy, Vydavateľstvo UK, 2016.
W. Walter: Analysis 2. Springer, Berlin, 2002.
W. Rudin: Principles of mathematical analysis. McGraw-Hill, Singapore, 1976.
B. P. Demidovich: Problems in Mathematical Analysis, Beekman Books, 1975.
I. Kluvánek, L. Mišík, M. Švec: Matematika 1. SVTL, Bratislava, 1966.
W. Fleming: Functions of Several Variables, Springer-Verlag, New York-Heidelberg-Berlin 1997.

Languages necessary to complete the course:
Slovak, English

Notes:

Past grade distribution
Total number of evaluated students: 805

A	B	C	D	E	FX
9,81	9,44	14,53	21,99	29,81	14,41

Lecturers: doc. RNDr. Zbyněk Kubáček, CSc., RNDr. František Jaroš, PhD., RNDr. Kristína Rostás, PhD.

Last change: 24.06.2022

Approved by: prof. RNDr. Ján Filo, CSc.

COURSE DESCRIPTION

Academic year: 2025/2026

University: Comenius University Bratislava

Faculty: Faculty of Mathematics, Physics and Informatics

Course ID:	**Course title:**
FMFI.KMANM/1-MAT-250/22	Mathematical Analysis (4)

Educational activities:
Type of activities: lecture / practicals
Number of hours:
per week: 4 / 2 **per level/semester:** 52 / 26
Form of the course: on-site learning

Number of credits: 8

Recommended semester: 4.

Educational level: I.

Prerequisites: FMFI.KAG/1-MAT-160/15 - Linear Algebra and Geometry (2) and FMFI.KMANM/1-MAT-150/00 - Mathematical Analysis (2)

Course requirements:
Ongoing evaluation: During semester a student is evaluated on exercises by at most 40 points. If a student obtains at least 20 points, he is admitted to the final exam.
Final exam: It consists of written part (60 points) and oral part (20 points). Achieving at least 30 points from written part is a condition for the oral part. Indicative rating scale: A 90%, B 80%, C 70%, D 60%, E 50%
Scale of assessment (preliminary/final): 40/60

Learning outcomes:
Absolvent of the subject has knowledge of integral calculus of functions of multiple variables and Fourier series and is capable of applying it for solving particular tasks of technical and natural sciences.

Class syllabus:
1. Curves and their parametrizations
Jordan curve, length of a curve, function of a path length, equivalent parametrizations
2. Line integrals
line integrals of first and second kind, path independence
3. Riemann integral in Rn
Jordan measure, integral, parametric integrals, Fubini theorem, transformation of multiple integrals, improper parametric integrals
4. Integral theorems
Gauss integral theorem in R2, surfaces in R3 and their area, surface integrals, Gauss integral theorem in R3, Green formula, Stokes theorem
5. Fourier series
trigonometric series, even and odd functions, Fourier series

Recommended literature:
J. Filo, K. Rostás: 2^2 × 13 prednášok z matematickej analýzy, Vydavateľstvo UK, 2016.

W. Walter: Analysis 2. Springer, Berlin, 2002.
B. P. Demidovich: Problems in Mathematical Analysis, Beekman Books, 1975.
I. Kluvánek, L. Mišík, M. Švec: Matematika 2. Alfa, Bratislava, 1970.
M. Demetrian: Fourierove rady a Fourierov integrál, Univerzita Komenského, 2012
J. Eliáš, J. Horváth, J. Kajan, R. Šulka: Zbierka úloh z vyššej matematiky, 4. časť, 3. vydanie, Alfa, 1979.

Languages necessary to complete the course:
Slovak, English

Notes:

Past grade distribution
Total number of evaluated students: 142

A	B	C	D	E	FX
14,08	12,68	7,75	19,72	20,42	25,35

Lecturers: RNDr. Michal Pospíšil, PhD., prof. RNDr. Pavol Quittner, DrSc., RNDr. František Jaroš, PhD.

Last change: 19.03.2025

Approved by: prof. RNDr. Ján Filo, CSc.

COURSE DESCRIPTION

Academic year: 2025/2026

University: Comenius University Bratislava

Faculty: Faculty of Mathematics, Physics and Informatics

Course ID:	**Course title:**
FMFI.KMANM/1-MAT-710/00	Mathematical Analysis Classes (1)

Educational activities:
Type of activities: practicals
Number of hours:
per week: 2 **per level/semester:** 26
Form of the course: on-site learning

Number of credits: 2

Recommended semester: 1.

Educational level: I.

Prerequisites:

Course requirements:
Continuous assessment: solving tasks at the board, elaboration of controlled homework, assessment from compulsory exercise
Indicative rating scale: A 90%, B 80%, C 70%, D 60%, E 50%
Scale of assessment (preliminary/final): 100/0

Learning outcomes:
After completing the course, students will be able to calculate problems in the field of differential calculus of a real function of one real variable.

Class syllabus:
Real numbers, functions of real variables. Limit of the function, basic theorems on limits. Compact sets. Continuity of a function in a point and on a set, basic properties of continuous functions on intervalas and compact sets. Derivative and general rules for differentiation. Repeated differentiation. Mean value theorems. Applications of the derivative. L´Hospital´s rule. Taylor´s polynomials.

Recommended literature:
Cvičenia z matematickej analýzy I / Zbyněk Kubáček, Ján Valášek. Bratislava : Univerzita Komenského, 2009

Languages necessary to complete the course:
Slovak, English

Notes:

Past grade distribution
Total number of evaluated students: 710

A	B	C	D	E	FX
39,72	14,93	14,08	11,83	10,56	8,87

Lecturers: RNDr. Kristína Rostás, PhD., Mgr. Július Pačuta, PhD.

Last change: 24.06.2022
Approved by: prof. RNDr. Ján Filo, CSc.

COURSE DESCRIPTION

Academic year: 2025/2026

University: Comenius University Bratislava

Faculty: Faculty of Mathematics, Physics and Informatics

Course ID:	**Course title:**
FMFI.KMANM/1-MAT-720/00	Mathematical Analysis Classes (2)

Educational activities:
Type of activities: practicals
Number of hours:
per week: 2 **per level/semester:** 26
Form of the course: on-site learning

Number of credits: 2

Recommended semester: 2.

Educational level: I.

Prerequisites:

Course requirements:
Continuous assessment: solving tasks at the board, elaboration of controlled homework, assessment from compulsory exercises
Indicative rating scale: A 90%, B 80%, C 70%, D 60%, E 50%
Scale of assessment (preliminary/final): 100/0

Learning outcomes:
After completing the course, students will be able to use the apparatus of integral calculus of functions of one real variable, series and series of functions to solve appropriate computational and theoretical problems.

Class syllabus:
Antiderivatives and indefinite integrals and techniques of integration. The definite integral and its properties. Integral as a limit of integral sums. Derivatives with variable endpoints. The fundamental theorem. Mean value theorems. Applications of the integral. Series of positive terms. Absolutely and conditionally convergent series. Series of functions. Pointwise and uniform convergence. Power series. Taylor series.

Recommended literature:
Cvičenia z matematickej analýzy II / Zbyněk Kubáček, Ján Valášek. Bratislava : Univerzita Komenského, 2010

Languages necessary to complete the course:
Slovak, English

Notes:

Past grade distribution
Total number of evaluated students: 583

A	B	C	D	E	FX
49,06	13,89	16,12	9,09	9,09	2,74

Lecturers: RNDr. Kristína Rostás, PhD., PaedDr. Peter Vankúš, PhD.
Last change: 24.06.2022
Approved by: prof. RNDr. Ján Filo, CSc.

COURSE DESCRIPTION

Academic year: 2025/2026

University: Comenius University Bratislava

Faculty: Faculty of Mathematics, Physics and Informatics

Course ID:	**Course title:**
FMFI.KMANM/1-MAT-750/00	Mathematical Analysis Classes (3)

Educational activities:
Type of activities: practicals
Number of hours:
per week: 2 **per level/semester:** 26
Form of the course: on-site learning

Number of credits: 2

Recommended semester: 3.

Educational level: I.

Prerequisites:

Course requirements:
Continuous assessment: solving tasks at the board, elaboration of controlled homework, assessment from compulsory exercises
Indicative rating scale: A 90%, B 80%, C 70%, D 60%, E 50%
Scale of assessment (preliminary/final): 100/0

Learning outcomes:
Absolvent of the subject has basic knowledge of metric spaces and differential calculus of scalar and vector functions of several variables and is capable of applying it for solving particular tasks in differential calculus of functions of several variables.

Class syllabus:
1. Metric spaces
n-dimensional Euclidean space Rn, convergence and Cauchy sequence in Rn, metric spaces, convergence in a metric space, complete metric space, normed space, Banach space, Banach fixed point theorem, topology of metric spaces, compact and convex sets, convex functions
2. Limit and continuity
limit and continuity in metric spaces, continuous vector functions, continuity and compactness
3. Differential calculus of functions of several variables
partial derivatives, gradient, total differential and differentiability, derivative of a compound function, directional derivative, Taylor theorem and local extrema
4. Implicitly given functions
implicit function theorem, constrained extrema, Lagrange multipliers

Recommended literature:
J. Filo, K. Rostás: 2^2 × 13 prednášok z matematickej analýzy, Vydavateľstvo UK, 2016.
W. Walter: Analysis 2. Springer, Berlin, 2002.
W. Rudin: Principles of mathematical analysis. McGraw-Hill, Singapore, 1976.
B. P. Děmidovič: Sbírka úloh a cvičení z matematické analýzy. z ruského originálu přeložili Miroslav Rozložník a Miroslav Tůma. Fragment, Havlíčkův Brod, 2003.

I. Kluvánek, L. Mišík, M. Švec: Matematika 1. SVTL, Bratislava, 1966.

Languages necessary to complete the course:
Slovak, English

Notes:

Past grade distribution
Total number of evaluated students: 436

A	B	C	D	E	FX
43,35	17,2	14,68	15,37	7,8	1,61

Lecturers: RNDr. Kristína Rostás, PhD., RNDr. František Jaroš, PhD.

Last change: 24.06.2022

Approved by: prof. RNDr. Ján Filo, CSc.

COURSE DESCRIPTION

Academic year: 2025/2026

University: Comenius University Bratislava

Faculty: Faculty of Mathematics, Physics and Informatics

Course ID:	**Course title:**
FMFI.KMANM/1-MAT-775/00	Mathematical Analysis Classes (4)

Educational activities:
Type of activities: practicals
Number of hours:
per week: 2 **per level/semester:** 26
Form of the course: on-site learning

Number of credits: 2

Recommended semester: 4.

Educational level: I.

Prerequisites:

Course requirements:
Continuous assessment: solving tasks at the board, elaboration of controlled homework, assessment from compulsory exercises
Indicative rating scale: A 90%, B 80%, C 70%, D 60%, E 50%
Scale of assessment (preliminary/final): 100/0

Learning outcomes:
Absolvent of the subject has knowledge of integral calculus of functions of multiple variables and Fourier series and is capable of applying it for solving particular tasks of technical and natural sciences.

Class syllabus:
1. Curves and their parametrizations
Jordan curve, length of a curve, function of a path length, equivalent parametrizations
2. Line integrals
line integrals of first and second kind, path independence
3. Riemann integral in Rn
Jordan measure, integral, parametric integrals, Fubini theorem, transformation of multiple integrals, improper parametric integrals
4. Integral theorems
Gauss integral theorem in R2, surfaces in R3 and their area, surface integrals, Gauss integral theorem in R3, Green formula, Stokes theorem
5. Fourier series
trigonometric series, even and odd functions, Fourier series

Recommended literature:
J. Filo, K. Rostás: 2^2 × 13 prednášok z matematickej analýzy, Vydavateľstvo UK, 2016.
W. Walter: Analysis 2. Springer, Berlin, 2002.
B. P. Děmidovič: Sbírka úloh a cvičení z matematické analýzy. z ruského originálu přeložili Miroslav Rozložník a Miroslav Tůma. Fragment, Havlíčkův Brod, 2003.

I. Kluvánek, L. Mišík, M. Švec: Matematika 2. Alfa, Bratislava, 1970.
M. Demetrian: Fourierove rady a Fourierov integrál, Univerzita Komenského, 2012
J. Eliáš, J. Horváth, J. Kajan, R. Šulka: Zbierka úloh z vyššej matematiky, 4. časť, 3. vydanie, Alfa, 1979.

Languages necessary to complete the course:
Slovak, English

Notes:

Past grade distribution
Total number of evaluated students: 413

A	B	C	D	E	FX
48,43	15,25	11,86	11,86	9,93	2,66

Lecturers: RNDr. Kristína Rostás, PhD., Mgr. Július Pačuta, PhD.

Last change: 24.06.2022

Approved by: prof. RNDr. Ján Filo, CSc.

COURSE DESCRIPTION

Academic year: 2025/2026

University: Comenius University Bratislava

Faculty: Faculty of Mathematics, Physics and Informatics

Course ID:	**Course title:**
FMFI.KAG/1-MAT-455/22	Mathematical Logic (1)

Educational activities:
Type of activities: lecture
Number of hours:
per week: 2 **per level/semester:** 26
Form of the course: on-site learning

Number of credits: 3

Recommended semester: 5.

Educational level: I.

Prerequisites:

Course requirements:

Learning outcomes:

Class syllabus:
Propositional calculus, propositional forms, provability, interpretations, tautologies, the completeness theorem.
Boolean algebras and filters and their relation to propositional calculus.
First order languages and structures. Terms, formulas and first order theories. Satisfaction of formulas, models of theories. Provability and the deduction theorem. Consistent, complete and Henkin theories. Gödel's completeness theorem. The compactness theorem and its consequencies. Examples of theories.

Recommended literature:
J. Shoenfield: Mathematical Logic, Adison-Wesley, Reading, 1967.
P. Štěpánek: Matematická logika, SPN, Prague, 1982.
A. Sochor: Klasická matematická logika, Karolinum, Prague, 2001.

Languages necessary to complete the course:

Notes:

Past grade distribution
Total number of evaluated students: 11

A	B	C	D	E	FX
81,82	0,0	9,09	0,0	0,0	9,09

Lecturers: prof. RNDr. Pavol Zlatoš, PhD.

Last change: 26.11.2021

Approved by: prof. RNDr. Ján Filo, CSc.

COURSE DESCRIPTION

Academic year: 2025/2026

University: Comenius University Bratislava

Faculty: Faculty of Mathematics, Physics and Informatics

Course ID:	**Course title:**
FMFI.KAG/1-MAT-480/22	Mathematical Logic (2)

Educational activities:
Type of activities: lecture
Number of hours:
per week: 2 **per level/semester:** 26
Form of the course: on-site learning

Number of credits: 3

Recommended semester: 6.

Educational level: I.

Prerequisites:

Course requirements:

Learning outcomes:

Class syllabus:
Substructures, homomorphisms and chains of structures. Elementary equivalence, elementary substructures and elementary chains. Tarski's criterion. Diagrams. Axiomatic and finitely axiomatizable classes. Universal, existential, universal-existential and positive formulas. Preservation of theories under algebraic constructions.
Filtered product, ultraproduct and ultrapower. Los' theorem. The compactnes theorem in the language of ultraproducts. Characterization of elementary equivalence and (finitely) axiomatizable classes.
The axiom of choice, the well-ordering priciple and maximality principles. Transfinite induction.

Recommended literature:
H. J. Keisler, C.C. Chang: Model Theory, North-Holland, Amsterdam, 1973.
P. Štěpánek: Matematická logika, SPN, Prague, 1982
B. Balcar, P. Štěpánek: Teorie množín, Academia, Prague, 1986.

Languages necessary to complete the course:

Notes:

Past grade distribution
Total number of evaluated students: 9

A	B	C	D	E	FX
77,78	0,0	22,22	0,0	0,0	0,0

Lecturers: prof. RNDr. Pavol Zlatoš, PhD.

Last change: 26.11.2021

Approved by: prof. RNDr. Ján Filo, CSc.

COURSE DESCRIPTION

Academic year: 2025/2026

University: Comenius University Bratislava

Faculty: Faculty of Mathematics, Physics and Informatics

Course ID:	**Course title:**
FMFI.KAG/1-MAT-270/00	Matrix Calculus

Educational activities:
Type of activities: lecture / practicals
Number of hours:
per week: 2 / 1 **per level/semester:** 26 / 13
Form of the course: on-site learning

Number of credits: 4

Recommended semester: 3.

Educational level: I.

Prerequisites: FMFI.KAG/1-MAT-160/15 - Linear Algebra and Geometry (2)

Course requirements:
Semester: homework, midterm exam
Exam: written exam
Approximate grade scheme: A 75%, B 65%, C 55%, D 45%, E 35%
Scale of assessment (preliminary/final): 50/50

Learning outcomes:
Student will gain basic theoretical knowledge to master the mathematical apparatus, which is standardly used to solve problems of applied mathematics. This course will provide her/him an overview how to solve various problems of numerical algebra.

Class syllabus:
Examples of the occurrence of matrices in practical tasks. LU-decomposition of a matrix and its modifications. Matrix norms. Projective (orthogonal and nonorthogonal) matrix. Last square problem. Generalized inverse matrix. QR-decomposition of a matrix (Gram-Schmidt orthogonalization, Householder's construction). Singular value decomposition of a matrix. Spectral properties of matrix. Gershgorin's theorem. Schur´s theorem. Several canonical forms of matrix. Hessenberg form of a matrix. Matrix functions defined over spectra of matrices. Normal matrix. Symmetric, positive definite, Hermitian matrix. The introduction to Perron-Frobenius's theory of nonnegative matrices. Practical applications for problems of numerical algebra.

Recommended literature:
Carl D. Meyer: Matrix Analysis and Applied Linear Algebra, SIAM, 2001
G. Strang: Linear Algebra and Its Applications, 4th edition, Cengage Learning, 2006
M. Fiedler: Speciální matice a jejich použití v numerické matematice, SNTL, Praha, 1981

Languages necessary to complete the course:
Slovak, English

Notes:

Past grade distribution Total number of evaluated students: 410					
A	B	C	D	E	FX
11,95	13,41	16,1	21,22	32,93	4,39
Lecturers: Mgr. Martin Niepel, PhD., prof. RNDr. Pavol Zlatoš, PhD., Mgr. Dávid Wilsch					
Last change: 14.03.2022					
Approved by: prof. RNDr. Ján Filo, CSc.					

COURSE DESCRIPTION

Academic year: 2025/2026

University: Comenius University Bratislava

Faculty: Faculty of Mathematics, Physics and Informatics

Course ID:	**Course title:**
FMFI.KMANM/1-MAT-185/00	Methods for Solving Mathematical Problems (1)

Educational activities:
Type of activities: practicals
Number of hours:
per week: 2 **per level/semester:** 26
Form of the course: on-site learning

Number of credits: 2

Recommended semester: 1.

Educational level: I.

Prerequisites:

Course requirements:
Scale of assessment (preliminary/final): 100/0

Learning outcomes:

Class syllabus:
Solving problems of the mathematical analysis, algebra and discrete mathematics from past mathematical competitions. The range of solved problems will depend on students.

Recommended literature:
Hecht, T. - Sklenáriková, Z.: Metódy riešenia matematických úloh. SPN, Bratislava 1992.
Larson, L. C.: Metódy riešenia matematických problémov. Alfa, Bratislava 1990.

Languages necessary to complete the course:

Notes:

Past grade distribution
Total number of evaluated students: 176

A	B	C	D	E	FX
56,25	8,52	7,39	7,95	11,93	7,95

Lecturers: RNDr. Monika Dillingerová, PhD.

Last change: 02.06.2015

Approved by: prof. RNDr. Ján Filo, CSc.

COURSE DESCRIPTION

Academic year: 2025/2026

University: Comenius University Bratislava

Faculty: Faculty of Mathematics, Physics and Informatics

Course ID:	**Course title:**
FMFI.KMANM/1-MAT-186/00	Methods for Solving Mathematical Problems (2)

Educational activities:
Type of activities: practicals
Number of hours:
per week: 2 **per level/semester:** 26
Form of the course: on-site learning

Number of credits: 2

Recommended semester: 2.

Educational level: I.

Prerequisites:

Course requirements:
Scale of assessment (preliminary/final): 100/1

Learning outcomes:

Class syllabus:
Solving problems of the mathematical analysis, algebra and discrete mathematics from past mathematical competitions. The range of solved problems will depend on students.

Recommended literature:
Hecht, T. - Sklenáriková, Z.: Metódy riešenia matematických úloh. SPN, Bratislava 1992.
Larson, L. C.: Metódy riešenia matematických problémov. Alfa, Bratislava 1990.

Languages necessary to complete the course:

Notes:

Past grade distribution
Total number of evaluated students: 83

A	B	C	D	E	FX
68,67	9,64	3,61	4,82	7,23	6,02

Lecturers: RNDr. Monika Dillingerová, PhD.

Last change: 02.06.2015

Approved by: prof. RNDr. Ján Filo, CSc.

COURSE DESCRIPTION

Academic year: 2025/2026

University: Comenius University Bratislava

Faculty: Faculty of Mathematics, Physics and Informatics

Course ID:	**Course title:**
FMFI.KAI/1-MAT-570/15	Modelling and Rendering Techniques

Educational activities:
Type of activities: lecture / practicals
Number of hours:
per week: 2 / 2 **per level/semester:** 26 / 26
Form of the course: on-site learning

Number of credits: 6

Recommended semester: 5.

Educational level: I.

Prerequisites:

Antirequisites: FMFI.KAI/1-MAT-570/00

Course requirements:
Continuous assessment: homework, individual work
Examination: written, oral
Indicative assessment scale: A 92%, B 84%, C 76%, D 68%, E 60%
For the semester, the student can get 50% for exercises, 30% for homework, the final written exam has a weight of 20% and the oral exam is voluntary for 20%. The student must solve at least 30% of each homework in order to pass the final written exam. Grading: 92-100 A, 84-91 B, 76-83 C, 68-75 D, 60-67 E. Details on the subject page.
Scale of assessment (preliminary/final): 30/70

Learning outcomes:
It acquaints students with the basic principles of geometric modeling, especially modeling of rigid teties, with the possibilities of local modifications of bodies and global operations on bodies represented by common techniques. Students will deepen their knowledge of rendering techniques.

Class syllabus:
The concept of geometric, quantitative and organizational model. Hierarchy in geometric models. Tools for defining objects, modifying them and storing them. Primitive (basic) objects and their most well-known characteristics. Local modifications and global operations with solids. CSG representation of objects (standard CSG primitives, regularized Boolean operations, identity transformations). Algorithm for construction of CSG - objects. Boundary representations of bodies (B - rep). Euler - Poincare formula and its meaning. Platonic bodies. Euler's operators. Boolean operations at border representations. Wall, edge and top representations of polyhedrons with non-variety surface. Solid modeling with polygonal meshes. Body modeling by sweeping methodology (extruded solids). Rendering techniques for shaded and color images. Object description-based rendering using implicit functions and CSG description. Basic principles of voxel rendering, image - oriented rendering and photo - modeling. Rendering of polygonal meshes. Rendering based on object or image redistribution techniques.

Recommended literature:

Languages necessary to complete the course:
Slovak, English

Notes:

Past grade distribution
Total number of evaluated students: 56

A	B	C	D	E	FX
23,21	39,29	8,93	10,71	8,93	8,93

Lecturers: prof. RNDr. Roman Ďurikovič, PhD.

Last change: 20.06.2022

Approved by: prof. RNDr. Ján Filo, CSc.

COURSE DESCRIPTION

Academic year: 2025/2026

University: Comenius University Bratislava

Faculty: Faculty of Mathematics, Physics and Informatics

Course ID:	**Course title:**
FMFI.KAG/1-MAT-470/00	Number Theory

Educational activities:
Type of activities: lecture
Number of hours:
per week: 2 **per level/semester:** 26
Form of the course: on-site learning

Number of credits: 3

Recommended semester: 5.

Educational level: I.

Prerequisites:

Course requirements:
Homework assignments, exam
Indicative evaluation scale: A 90%, B 80%, C 70%, D 60%, E 50%
Scale of assessment (preliminary/final): Semester 25% (homework assignments) / 75% final exam (oral exam).

Learning outcomes:
Students will be able to use basic results on divisibility and prime numbers to solve elementary number-theoretic problems. They will be able to use reciprocity laws to check whether a given number is a quadratic residue.

Class syllabus:
The divisibility in Z. Prime numbers, the prime number theorem and its applications. Elementar arithmetic functions. Perfect numbers. Congruences. The Euler's Totient Theorem. Pythagorean triangles.

Recommended literature:
M. Kolibiar a kol.: Algebra a príbuzné disciplíny, Alfa, Bratislava, 1992
T. Šalát: Vybrané kapitoly z elementárnej teórie čísel, Univerzita Komenského, Bratislava, 1983
T. Šalát: Algrebra a teoretická aritmetika (2), Alfa, Bratislava, 1986
Š. Znám: Teória čísel, Alfa, Bratislava, 1977

Languages necessary to complete the course:

Notes:

Past grade distribution
Total number of evaluated students: 187

A	B	C	D	E	FX
72,73	11,23	7,49	3,74	2,67	2,14

Lecturers: RNDr. Martin Sleziak, PhD., doc. RNDr. Martin Mačaj, PhD.

Last change: 18.06.2022
Approved by: prof. RNDr. Ján Filo, CSc.

COURSE DESCRIPTION

Academic year: 2025/2026

University: Comenius University Bratislava

Faculty: Faculty of Mathematics, Physics and Informatics

Course ID:	**Course title:**
FMFI.KMANM/1-MAT-240/00	Numerical Mathematics (1)

Educational activities:
Type of activities: lecture / practicals
Number of hours:
per week: 2 / 2 **per level/semester:** 26 / 26
Form of the course: on-site learning

Number of credits: 5

Recommended semester: 4.

Educational level: I., II.

Prerequisites: FMFI.KMANM/1-MAT-150/00 - Mathematical Analysis (2) or FMFI.KMANM/1-INF-150/22 - Mathematical Analysis (2) or FMFI.KAMŠ/1-DAV-102/20 - Calculus (1) or FMFI.KMANM/1-INF-150/00 - Mathematical Analysis (2) or FMFI.KMANM/1-MMN-150/15 - Mathematical Analysis (2)

Course requirements:
Preliminary assessment: 2 written tests 10 points each, individual work 10 points
Final examination: written exam for 50 points and oral exam for 20 points
Indicative assessment scale: A 88%, B 78%, C 68%, D 58%, E 48%
Scale of assessment (preliminary/final): 30/70

Learning outcomes:
After completing the course, students will be able to solve numerical mathematics problems from mathematical analysis, algebra, applied mathematics and practice using computers and available software.

Class syllabus:
Position of numerical mathematics in solving of real problems. Concept of stability. Errors and computational arithmetic. The solution of nonlinear equations. Solution of system nonlinear equations. Approximation of functions. Interpolation - Lagrange's and Newton's interpolation polynomial and their errors. Optimal selection of interpolations point. Chebyshev polynomials. Linear and cubic splines. The least square method. Numerical differentiation. Numerical quadrature.
The solution of simultaneous linear equations.

Recommended literature:
Lars Eldén, Linde Wittmeyer-Koch: Numerical analysis An Introduction ACADEMIC Press, INC, San Diego, 1990.
J. Babušíková, M. Slodička, J. Weisz : Numerická matematika , UK Bratislava, 1999 (skriptá).
S. Míka: Numerické metody algebry, SNTL Praha 1982.
P. Přikryl: Numerické metody matematické analýzy, SNTL Praha 1985.
A. Ralston: A first course in numerical analysis, New York, 1965.

R. L.Burden, J. D. Faires: Numerical Analysis, Cengage Learning, 2010.

Languages necessary to complete the course:
Slovak and English

Notes:

Past grade distribution
Total number of evaluated students: 1025

A	B	C	D	E	FX
19,02	21,85	21,56	15,61	18,83	3,12

Lecturers: Mgr. Jela Babušíková, PhD., RNDr. Patrik Mihala, PhD.

Last change: 21.06.2022

Approved by: prof. RNDr. Ján Filo, CSc.

COURSE DESCRIPTION

Academic year: 2025/2026

University: Comenius University Bratislava

Faculty: Faculty of Mathematics, Physics and Informatics

Course ID:	**Course title:**
FMFI.KMANM/1-MAT-780/00	Numerical Mathematics (2)

Educational activities:
Type of activities: lecture / practicals
Number of hours:
per week: 2 / 2 **per level/semester:** 26 / 26
Form of the course: on-site learning

Number of credits: 5

Recommended semester: 5.

Educational level: I.

Prerequisites: FMFI.KMANM/1-MAT-240/00 - Numerical Mathematics (1)

Course requirements:
Continuous assessment: individual work, test
Exam: Written and oral test
Scale of assessment (preliminary/final): 40/60

Learning outcomes:
After completing this course, students are able to numerically solve more specific mathematics problems.

Class syllabus:
Polynomial interpolation and various types of cubic splines. General least square mehod - trigonometric polynomial, Chebyshev expansions. Polynomial roots - Graeff and Bairstow methods. Gauss quadrature. Approximation of eigenvalues and eigenvectors.

Recommended literature:
Lars Eldén, Linde Wittmeyer-Koch: Numerical analysis An Introduction ACADEMIC Press, INC, San Diego, 1990.
Jela Babušíková, Marián Slodička, Juraj Weisz: Numerické metódy, Bratislava : Univerzita Komenského, 2000
Stanislav Míka: Numerické metody algebry, Praha : Státní nakladatelství technické literatury, 1985
Petr Přikryl: Numerické metody matematické analýzy, Praha : Státní nakladatelství technické literatury, 1985
R. L.Burden, J. D. Faires: Numerical Analysis, Cengage Learning, 2010.
A. Ralston: A first course in numerical analysis, New York, 1965.

Languages necessary to complete the course:
Slovak, English

Notes:

Past grade distribution Total number of evaluated students: 666					
A	B	C	D	E	FX
17,72	24,77	21,32	20,27	14,71	1,2
Lecturers: Mgr. Jela Babušíková, PhD., Dr. Hana Šmitala Mizerová					
Last change: 21.06.2022					
Approved by: prof. RNDr. Ján Filo, CSc.					

COURSE DESCRIPTION

Academic year: 2025/2026

University: Comenius University Bratislava

Faculty: Faculty of Mathematics, Physics and Informatics

Course ID:	**Course title:**
FMFI.KAG/1-MAT-530/15	Numerical Methods of Linear Algebra

Educational activities:
Type of activities: lecture / practicals
Number of hours:
per week: 2 / 2 **per level/semester:** 26 / 26
Form of the course: on-site learning

Number of credits: 5

Recommended semester: 6.

Educational level: I., II.

Prerequisites: FMFI.KAG/1-MAT-270/00 - Matrix Calculus

Course requirements:
Interim evaluation: Programing exercises - 30% of final grade
Final Exam: Oral examination - 70% of final grade
Student need at least half of the maximum number of points to be able to attend the final exam.
Indicative assessment scale: A 90%, B 80%, C 70%, D 60%, E 50%
Scale of assessment (preliminary/final): 30% homework / 70% final exam

Learning outcomes:
theoretical knowledge and practical experience (through available software and the creation of a separate program) with various numerical methods for solving linear algebra problems; ability to deal with the stability of the solution (analysis of the causes of instability, the limit of the possibility of its elimination) and error estimation

Class syllabus:
Direct methods for solving a regular system of linear algebraic equations. Solution stability and error estimation. Iterative methods of regular system solution. Least squares problem for singular matrices with complete rank (QR-decomposition) and incomplete rank (pseudoinversion, regularization). Numerical methods for solving partial and complete eigenvalue problems (for symmetric and asymmetric matrices). Stability of eigenvalues problem. Numerical calculation of singular decomposition.

Recommended literature:
Numerické metódy lineárnej algebry / Taťjana Bušinská. Bratislava : Univerzita Komenského, 1993
G. H. Golub, C. F. Van Loan: Matrix Computations, John's Hopkins University Press, 1996
J. W. Demmel: Applied Numerical Linear Algebra, Society for Indrustrial and Applied Mathemaitcs, 1997
C. D. Meyer: Matrix Analysis and Applied Linear Algebra, SIAM, 2000

Languages necessary to complete the course:
Slovak, English

Notes:

Past grade distribution
Total number of evaluated students: 20

A	B	C	D	E	FX
30,0	20,0	25,0	10,0	10,0	5,0

Lecturers: Mgr. Ľudovít Balko, PhD., doc. RNDr. Andrej Ferko, PhD.

Last change: 22.06.2022

Approved by: prof. RNDr. Ján Filo, CSc.

COURSE DESCRIPTION

Academic year: 2025/2026

University: Comenius University Bratislava

Faculty: Faculty of Mathematics, Physics and Informatics

Course ID:	**Course title:**
FMFI.KI/1-MAT-230/15	Operation Systems and Computer Networks

Educational activities:
Type of activities: lecture
Number of hours:
per week: 2 **per level/semester:** 26
Form of the course: on-site learning

Number of credits: 2

Recommended semester: 3.

Educational level: I.

Prerequisites:

Antirequisites: FMFI.KI/1-MAT-230/00

Course requirements:
Activity during lectures (50%), written test (50%)
Approximate grading scale: A 90%, B 80%, C 70%, D 60%, E 50%
Scale of assessment (preliminary/final): 100/0

Learning outcomes:
After completing the course, students will have an overview of the principles of computer operation, the tasks and principles of operating systems and the principles of operation and secure use of computer networks and their services.

Class syllabus:
Basic concepts of computer systems (processor, memory, input-output devices).
Basic concepts of operating systems, processes, memory management, input and output management, file systems, access control, virtualization.
Basic concepts of computer networks, reference model OSI, TCP/IP, e-mail and web, security aspects.

Recommended literature:
Computer networks / Andrew S. Tanenbaum. Upper Saddle River : Prentice-Hall, 2003 Operating systems : Internals and design principles / William Stallings. Upper Saddle River : Pearson/ Prentice Hall, 2005
Teachers' own electronic texts published on the course's web page.

Languages necessary to complete the course:
Slovak, English

Notes:

Past grade distribution Total number of evaluated students: 68					
A	B	C	D	E	FX
41,18	25,0	13,24	10,29	2,94	7,35
Lecturers: RNDr. Jaroslav Janáček, PhD.					
Last change: 22.06.2022					
Approved by: prof. RNDr. Ján Filo, CSc.					

COURSE DESCRIPTION

Academic year: 2025/2026

University: Comenius University Bratislava

Faculty: Faculty of Mathematics, Physics and Informatics

Course ID:	**Course title:**
FMFI.KAMŠ/1-PMA-571/22	Optimization and Computational Methods

Educational activities:
Type of activities: lecture
Number of hours:
per week: 2 **per level/semester:** 26
Form of the course: on-site learning

Number of credits: 3

Recommended semester: 6.

Educational level: I.

Prerequisites: FMFI.KAMŠ/1-EFM-250/00 - Mathematical Analysis (4) or FMFI.KMANM/1-MAT-250/22 - Mathematical Analysis (4)

Course requirements:
Evaluation based on: homeworks (teaching period), oral exam
Approximate grade thresholds: A 90%, B 80%, C 70%, D 60%, E 50%
Scale of assessment (preliminary/final): 60/40

Learning outcomes:
The students will understand the basics of the optimization theory. They will also learn to solve optimization and other computational problems by using the statistical software R. This will allow them to deal with optimization and computational problems that arise in statistics, insurance mathematics and data analysis.

Class syllabus:
Basic concepts of mathematical optimization. Constrained and unconstrained optimization – univariate and multivariate. Iterative solution methods (e.g., gradient method, Newton method). Convex optimization. Duality. Solving optimization problems using statistical software. Effective programming in statistical software – computations and simulations.

Recommended literature:
Hamala M, Trnovská M: Nelineárne programovanie, teória a algoritmy, EPOS, 2013;
Boyd S, Vandenberghe L: Convex optimization, Cambridge University Press, 2004

Languages necessary to complete the course:
Slovak, English

Notes:

Past grade distribution
Total number of evaluated students: 28

A	B	C	D	E	FX
42,86	28,57	21,43	0,0	7,14	0,0

Lecturers: Mgr. Samuel Rosa, PhD.

Last change: 18.06.2022
Approved by: prof. RNDr. Ján Filo, CSc.

COURSE DESCRIPTION

Academic year: 2025/2026

University: Comenius University Bratislava

Faculty: Faculty of Mathematics, Physics and Informatics

Course ID:	**Course title:**
FMFI.KMANM/1-MAT-310/00	Ordinary Differential Equations (1)

Educational activities:
Type of activities: lecture / practicals
Number of hours:
per week: 2 / 2 **per level/semester:** 26 / 26
Form of the course: on-site learning

Number of credits: 5

Recommended semester: 4.

Educational level: I.

Prerequisites: FMFI.KMANM/1-MAT-210/22 - Mathematical Analysis (3) or FMFI.KMANM/1-MAT-210/00 - Mathematical Analysis (3)

Recommended prerequisites:
1-MAT-250 Mathematical Analysis (4)

Course requirements:
interim and final exam:
continuous examination: tests(45%); final exam: written test(35%) and oral examination(20%)
Grades:
100-91% (A); 90-81% (B); 80-71% (C); 70-61% (D); 60-51% (E), 50-0% (Fx)
Scale of assessment (preliminary/final): 45/55

Learning outcomes:
The graduate will acquire basic knowledge of the theory of ordinary differential equations, which will enable him to follow the lectures Ordinary Differential Equations (2) and Dynamical Systems. He will be able to apply this theory in the analysis of some simpler mathematical models from the field of natural and technical sciences.

Class syllabus:
Mathematical models in the form of differential equations (DE). Basic methods of solving of differential equations. Systems of differential equations with continuous right-hand sides: The existence and uniqueness. Picard's theorem on the existence and uniqueness of solutions. The Peano existence theorem. Linear systems of differential equations and linear n-th order differential equations. Higher order linear differential equations with constant coefficients. Laplace transform and its application in solving linear differential equations with constant coefficients.

Recommended literature:
M. Greguš, M. Švec, V. Šeda: Obyčajné diferenciálne rovnice, Alfa, 1985.
I. Bock, Ľ. Marko: Diferenciálne rovnice, skriptá, FEI STU
B. P. Demidovič: Lekcii po matematičeskoj teorii ustojčivosti, Nauka
J. Nagy: Diferenciálne rovnice, SNTL Praha
M. Medveď: Dynamické systémy, UK Bratislava 2000.

J. Kurzweil: Obyčejné diferenciální rovnice- Úvod do teorie obyčejných diferenciálních rovnic v reálném oboru, Státní nakladatelství technické literatury, Praha 1978.

Languages necessary to complete the course:
Slovak

Notes:

Past grade distribution
Total number of evaluated students: 322

A	B	C	D	E	FX
36,34	18,94	19,88	13,35	10,87	0,62

Lecturers: prof. RNDr. Milan Medveď, DrSc., prof. RNDr. Pavol Quittner, DrSc., RNDr. František Jaroš, PhD.

Last change: 21.06.2022

Approved by: prof. RNDr. Ján Filo, CSc.

COURSE DESCRIPTION

Academic year: 2025/2026

University: Comenius University Bratislava

Faculty: Faculty of Mathematics, Physics and Informatics

Course ID:	**Course title:**
FMFI.KMANM/1-MAT-425/25	Ordinary Differential Equations (2)

Educational activities:
Type of activities: lecture / practicals
Number of hours:
per week: 3 / 2 **per level/semester:** 39 / 26
Form of the course: on-site learning

Number of credits: 7

Recommended semester: 5.

Educational level: I.

Prerequisites: FMFI.KMANM/1-MAT-310/00 - Ordinary Differential Equations (1)

Course requirements:
Scale of assessment (preliminary/final): 20/80

Learning outcomes:

Class syllabus:
1. Continuation of the theory of systems of differential equations.
2. Existence, uniqueness and dependence of solutions on initial conditions and parameters.
3. Qualitative theory of differential equations.
4. Autonomous systems and their properties. Method of linearization.
5. Differential inequalities.
6. Asymptotic properties and stability of solutions.
7. Boundary value problems, eigenfunctions and eigenvalues.
8. Comparison theorems.

Recommended literature:
Greguš, M. - Švec, M. - Šeda, V.: Obyčajné diferenciálne rovnice, Alfa, Bratislava 1985.
Brikhoff, G. - Rota, G. C.: Ordinary Differential Equations, Ginn and Co., 1962.
Kurzweil, J.: Obyčejné diferenciální rovnice, SNTL, Praha 1978.
Redheffer, R.: Differential Equations. Theory and Applications, Jones & Bartlett Publish., Boston 1991.

Languages necessary to complete the course:

Notes:

Past grade distribution
Total number of evaluated students: 72

A	B	C	D	E	FX
56,94	15,28	12,5	8,33	6,94	0,0

Lecturers: prof. RNDr. Jaroslav Jaroš, CSc., RNDr. František Jaroš, PhD.

Last change: 20.05.2025
Approved by: prof. RNDr. Ján Filo, CSc.

COURSE DESCRIPTION

Academic year: 2025/2026

University: Comenius University Bratislava

Faculty: Faculty of Mathematics, Physics and Informatics

Course ID:	**Course title:**
FMFI.KAI/2-MXX-132/23	Participation in Empirical Research

Educational activities:
Type of activities: course
Number of hours:
per week: 2 **per level/semester:** 26
Form of the course: on-site learning

Number of credits: 2

Recommended semester: 1., 3., 5.

Educational level: I., I.II., II.

Prerequisites:

Course requirements:

Learning outcomes:

Class syllabus:

Recommended literature:

Languages necessary to complete the course:

Notes:

Past grade distribution
Total number of evaluated students: 201

A	B	C	D	E	FX
89,55	1,49	1,49	0,0	2,99	4,48

Lecturers: Mgr. Xenia Daniela Poslon, PhD.

Last change: 06.09.2023

Approved by: prof. RNDr. Ján Filo, CSc.

COURSE DESCRIPTION

Academic year: 2025/2026

University: Comenius University Bratislava

Faculty: Faculty of Mathematics, Physics and Informatics

Course ID:	**Course title:**
FMFI.KAI/2-MXX-132/23	Participation in Empirical Research

Educational activities:
Type of activities: course
Number of hours:
per week: 2 **per level/semester:** 26
Form of the course: on-site learning

Number of credits: 2

Recommended semester: 2., 4., 6.

Educational level: I., I.II., II.

Prerequisites:

Course requirements:

Learning outcomes:

Class syllabus:

Recommended literature:

Languages necessary to complete the course:

Notes:

Past grade distribution
Total number of evaluated students: 201

A	B	C	D	E	FX
89,55	1,49	1,49	0,0	2,99	4,48

Lecturers: Mgr. Xenia Daniela Poslon, PhD.

Last change: 06.09.2023

Approved by: prof. RNDr. Ján Filo, CSc.

COURSE DESCRIPTION

Academic year: 2025/2026

University: Comenius University Bratislava

Faculty: Faculty of Mathematics, Physics and Informatics

Course ID:	**Course title:**
FMFI.KTV/1-MXX-110/00	Physical Education and Sport (1)

Educational activities:
Type of activities: practicals
Number of hours:
per week: 2 **per level/semester:** 26
Form of the course: on-site learning

Number of credits: 0

Recommended semester: 1.

Educational level: I., I.II.

Prerequisites:

Course requirements:
Grades: A 90%, B 80%, C 70%, D 60%, E 50%
Scale of assessment (preliminary/final): 100/0

Learning outcomes:
Orientation in the history of the selected sports discipline, mastering the basic principles of compensation of mostly mental burdens of the individual. Creating a positive, lasting relationship to physical education and sports in the sense of calocagation. Mastering the demands for the development of motor abilities, skills, proper technique of performing individual movements in individual sports, individual game activities in collective sports games.

Class syllabus:
Introduction to the basic history of the selected sport, with the basic principles of compensation of one-sided psychological burden of the individual's body. Development of basic motor skills with a stop to all kinds of endurance, coordination, increasing the level of joint mobility. Training of individual game activities in collective sports games. In individual sports disciplines, practice of basic techniques of individual elements.

Recommended literature:

Languages necessary to complete the course:
Slovak, English

Notes:

Past grade distribution
Total number of evaluated students: 7053

A	B	C	D	E	FX
93,31	1,6	0,21	0,0	0,07	4,81

Lecturers: Mgr. Ladislav Mókus, PaedDr. Dana Mašlejová, Mgr. Jana Leginusová, Mgr. Tomáš Kuchár, PhD., PaedDr. Mikuláš Ortutay, Mgr. Martin Dovičák, PhD., Mgr. Júlia Raábová, PhD., Mgr. Branislav Nedbálek, PhD., Mgr. Tomáš Lovecký

Last change: 16.06.2022
Approved by: prof. RNDr. Ján Filo, CSc.

COURSE DESCRIPTION

Academic year: 2025/2026

University: Comenius University Bratislava

Faculty: Faculty of Mathematics, Physics and Informatics

Course ID:	**Course title:**
FMFI.KTV/1-MXX-120/22	Physical Education and Sport (2)

Educational activities:
Type of activities: practicals
Number of hours:
per week: 2 **per level/semester:** 26
Form of the course: on-site learning

Number of credits: 1

Recommended semester: 2.

Educational level: I., I.II.

Prerequisites:

Course requirements:
Grades: A 90%, B 80%, C 70%, D 60%, E 50%
Scale of assessment (preliminary/final): 100/0

Learning outcomes:
Addressing a positive and lasting relationship with physical education and sport by understanding the importance of physical development and maintaining its optimal level throughout life. The use of strength and other motor skills to more rationally manage the game activities of the individual, while improving the acquisition of more complex elements of technology. In everyday life in providing basic necessities.

Class syllabus:
Completing a positive lasting relationship to physical education and sport. Development of motor skills with a focus on the development of strength, with an emphasis on dynamic strength and endurance in strength. In collective sports games, improving individual game activities, practicing basic game combinations, playing with modified rules, tasked games. In individual sports disciplines, the development of motor abilities and skills necessary for the acquisition of more complex elements of lower difficulty techniques.

Recommended literature:

Languages necessary to complete the course:
Slovak, English

Notes:

Past grade distribution
Total number of evaluated students: 5840

A	B	C	D	E	FX
95,6	1,51	0,14	0,09	0,05	2,62

Lecturers: Mgr. Tomáš Kuchár, PhD., PaedDr. Dana Mašlejová, Mgr. Ladislav Mókus, Mgr. Jana Leginusová, PaedDr. Mikuláš Ortutay, Mgr. Martin Dovičák, PhD., Mgr. Júlia Raábová, PhD., Mgr. Branislav Nedbálek, PhD., Mgr. Tomáš Lovecký
Last change: 15.03.2022
Approved by: prof. RNDr. Ján Filo, CSc.

COURSE DESCRIPTION

Academic year: 2025/2026

University: Comenius University Bratislava

Faculty: Faculty of Mathematics, Physics and Informatics

Course ID:	**Course title:**
FMFI.KTV/1-MXX-210/00	Physical Education and Sport (3)

Educational activities:
Type of activities: practicals
Number of hours:
per week: 2 **per level/semester:** 26
Form of the course: on-site learning

Number of credits: 2

Recommended semester: 3.

Educational level: I., I.II.

Prerequisites:

Course requirements:
Scale of assessment (preliminary/final): 100/0

Learning outcomes:

Class syllabus:
To practise game combinations, tactical - mechanical elements in basketball, volleyball, soccer, floorball, ice hockey, badminton, competition rules in the sports specialization.

Recommended literature:

Languages necessary to complete the course:
Slovak, English

Notes:

Past grade distribution
Total number of evaluated students: 3268

A	B	C	D	E	FX
98,29	0,46	0,09	0,03	0,0	1,13

Lecturers: Mgr. Tomáš Kuchár, PhD., Mgr. Jana Leginusová, PaedDr. Dana Mašlejová, Mgr. Ladislav Mókus, PaedDr. Mikuláš Ortutay, Mgr. Martin Dovičák, PhD., Mgr. Júlia Raábová, PhD., Mgr. Branislav Nedbálek, PhD., Mgr. Tomáš Lovecký

Last change: 16.06.2022

Approved by: prof. RNDr. Ján Filo, CSc.

COURSE DESCRIPTION

Academic year: 2025/2026

University: Comenius University Bratislava

Faculty: Faculty of Mathematics, Physics and Informatics

Course ID:	**Course title:**
FMFI.KTV/1-MXX-220/00	Physical Education and Sport (4)

Educational activities:
Type of activities: practicals
Number of hours:
per week: 2 **per level/semester:** 26
Form of the course: on-site learning

Number of credits: 2

Recommended semester: 4.

Educational level: I., I.II.

Prerequisites:

Course requirements:
Scale of assessment (preliminary/final): 100/0

Learning outcomes:

Class syllabus:
Preparation for sport championships of the Faculty in the chosen sport at modified rules. The selection of talented students into the teams of the University and Faculty leagues and other faculty sport events.

Recommended literature:

Languages necessary to complete the course:
Slovak, English

Notes:

Past grade distribution
Total number of evaluated students: 2956

A	B	C	D	E	FX
97,94	0,17	0,1	0,03	0,0	1,76

Lecturers: Mgr. Tomáš Kuchár, PhD., Mgr. Ladislav Mókus, Mgr. Jana Leginusová, PaedDr. Dana Mašlejová, PaedDr. Mikuláš Ortutay, Mgr. Martin Dovičák, PhD., Mgr. Júlia Raábová, PhD., Mgr. Branislav Nedbálek, PhD., Mgr. Tomáš Lovecký

Last change: 15.03.2022

Approved by: prof. RNDr. Ján Filo, CSc.

COURSE DESCRIPTION

Academic year: 2025/2026

University: Comenius University Bratislava

Faculty: Faculty of Mathematics, Physics and Informatics

Course ID:	**Course title:**
FMFI.KTV/1-MXX-310/00	Physical Education and Sport (5)

Educational activities:
Type of activities: practicals
Number of hours:
per week: 2 **per level/semester:** 26
Form of the course: on-site learning

Number of credits: 2

Recommended semester: 5.

Educational level: I., I.II.

Prerequisites:

Course requirements:
Scale of assessment (preliminary/final): 100/0

Learning outcomes:

Class syllabus:
Preparation and participation of individuals and teams in the system of university sport competitions and sport events.

Recommended literature:

Languages necessary to complete the course:
Slovak, English

Notes:

Past grade distribution
Total number of evaluated students: 2172

A	B	C	D	E	FX
98,66	0,37	0,09	0,0	0,0	0,87

Lecturers: Mgr. Tomáš Kuchár, PhD., Mgr. Ladislav Mókus, Mgr. Jana Leginusová, PaedDr. Dana Mašlejová, PaedDr. Mikuláš Ortutay, Mgr. Martin Dovičák, PhD., Mgr. Júlia Raábová, PhD., Mgr. Branislav Nedbálek, PhD., Mgr. Tomáš Lovecký

Last change: 15.03.2022

Approved by: prof. RNDr. Ján Filo, CSc.

COURSE DESCRIPTION

Academic year: 2025/2026

University: Comenius University Bratislava

Faculty: Faculty of Mathematics, Physics and Informatics

Course ID:	**Course title:**
FMFI.KTV/1-MXX-320/22	Physical Education and Sport (6)

Educational activities:
Type of activities: practicals
Number of hours:
per week: 2 **per level/semester:** 26
Form of the course: on-site learning

Number of credits: 1

Recommended semester: 6.

Educational level: I., I.II.

Prerequisites:

Antirequisites: FMFI.KTV/1-MXX-320/00

Course requirements:
Scale of assessment (preliminary/final): 100/0

Learning outcomes:

Class syllabus:
Using the communication in the physical education and sport and organizing the sport championships to achieve expressive motion of the sport and health in a valuable orientation the students.

Recommended literature:

Languages necessary to complete the course:
Slovak, English

Notes:

Past grade distribution
Total number of evaluated students: 204

A	B	C	D	E	FX
94,61	0,49	0,49	0,0	0,0	4,41

Lecturers: PaedDr. Dana Mašlejová, Mgr. Ladislav Mókus, Mgr. Jana Leginusová, Mgr. Tomáš Kuchár, PhD., PaedDr. Mikuláš Ortutay, Mgr. Martin Dovičák, PhD., Mgr. Júlia Raábová, PhD., Mgr. Branislav Nedbálek, PhD., Mgr. Tomáš Lovecký

Last change: 15.03.2022

Approved by: prof. RNDr. Ján Filo, CSc.

COURSE DESCRIPTION

Academic year: 2025/2026

University: Comenius University Bratislava

Faculty: Faculty of Mathematics, Physics and Informatics

Course ID:	**Course title:**
FMFI.KAMŠ/1-PMA-520/22	Probability Theory

Educational activities:
Type of activities: lecture
Number of hours:
per week: 2 **per level/semester:** 26
Form of the course: on-site learning

Number of credits: 3

Recommended semester: 6.

Educational level: I.

Prerequisites: FMFI.KAMŠ/1-MAT-282/00 - Probability and Statistics (2)

Course requirements:

Learning outcomes:

Class syllabus:
Stable distributions: definition, explicit densities, characteristic functions, properties. Generalised central limit theorem for sums of independent identically distributed (iid) variables with infinite second moment. Large deviation theory for sums of iid variables: moment generating function, exponential tilting, deviation function. Heavy-tailed and subexponential distributions: single big jump principle for sums of iid subexponential variables.

Recommended literature:
x

Languages necessary to complete the course:

Notes:

Past grade distribution
Total number of evaluated students: 297

A	B	C	D	E	FX
16,16	15,15	16,5	19,19	26,94	6,06

Lecturers: doc. Mgr. Pavol Bokes, PhD.

Last change: 24.11.2021

Approved by: prof. RNDr. Ján Filo, CSc.

COURSE DESCRIPTION

Academic year: 2025/2026

University: Comenius University Bratislava

Faculty: Faculty of Mathematics, Physics and Informatics

Course ID:	**Course title:**
FMFI.KAMŠ/1-MAT-281/00	Probability and Statistics (1)

Educational activities:
Type of activities: lecture / practicals
Number of hours:
per week: 2 / 1 **per level/semester:** 26 / 13
Form of the course: on-site learning

Number of credits: 4

Recommended semester: 3.

Educational level: I.

Prerequisites: (FMFI.KMANM/1-MAT-150/00 - Mathematical Analysis (2) or FMFI.KAMŠ/1-EFM-130/00 - Mathematical Analysis (2)) and (FMFI.KAG/1-MAT-120/15 - Linear Algebra and Geometry (1) or FMFI.KAG/1-MMN-120/22 - Linear Algebra and Geometry (1) or FMFI.KAG/1-MMN-120/00 - Linear Algebra and Geometry (1) or FMFI.KAG/1-EFM-121/15 - Linear Algebra and Geometry (1))

Course requirements:
Preliminary semester evaluation: a test
Examination: written examination
Approximate grade thresholds: A 90%, B 80%, C 70%, D 60%, E 50%
Scale of assessment (preliminary/final): 50/50

Learning outcomes:
After completing the course the student will be able to use classical probability models, axiomatic approach to the definition of probability. He will master one dimensional discrete and continuous random variables. He will be given an introduction to selected statistical procedures: point and interval estimates of parameters sampling normal distribution.

Class syllabus:
Probability space. Classical probability models. Random variable and distribution function. Elementary discrete and continuous distributions, expectation and variance. Independence and correlation. Normal distribution and the central limit theorem. Random sample, sample mean, sample variance. Sampling normal distribution. Estimation of parameters, maximal likelihood, confidence intervals for the mean of a normal distribution.

Recommended literature:
Janková, K., Pázman, A.: Pravdepodobnosť a štatistika, Vydavateľstvo UK 2011
Harman, R., Honschová, E., Somorčík, J.: Zbierka úloh zo základov teórie pravdepodobnosti, Paci Bratislava 2009
G.R.Grimmett, D. Stirzaker: Probability and Random Processes. Oxford University Press 2001

Languages necessary to complete the course:
Slovak, English

Notes:

Past grade distribution
Total number of evaluated students: 1545

A	B	C	D	E	FX
17,61	12,49	17,67	21,75	23,95	6,54

Lecturers: doc. RNDr. Katarína Janková, CSc., Mgr. Erika Lejtrich

Last change: 09.03.2022

Approved by: prof. RNDr. Ján Filo, CSc.

COURSE DESCRIPTION

Academic year: 2025/2026

University: Comenius University Bratislava

Faculty: Faculty of Mathematics, Physics and Informatics

Course ID:	**Course title:**
FMFI.KAMŠ/1-MAT-282/00	Probability and Statistics (2)

Educational activities:
Type of activities: lecture / practicals
Number of hours:
per week: 2 / 1 **per level/semester:** 26 / 13
Form of the course: on-site learning

Number of credits: 4

Recommended semester: 4.

Educational level: I.

Prerequisites: FMFI.KAMŠ/1-MAT-281/00 - Probability and Statistics (1)

Course requirements:
Preliminary assessment: test
Examination: written examination
Approximate final assessment: A 90%, B 80%, C 70%, D 60%, E 50%
Scale of assessment (preliminary/final): 30/70

Learning outcomes:
After completing the course the student will master multivariate discrete and continuous distributions. He will be able to calculate distributions of sums, products and ratios of independent random variables. He will know the technique of characteristic functions and will be able to apply it to the multidimensional normal distribution. The knowledge of probability methods will be applied to selected statistical problems of parameter estimation and hypotheses testing.

Class syllabus:
Multiple random variables, their distribution and characteristics. Elementary introduction to Lebesgue integral. Marginal and conditional distributions and densities. Independence, sums of independent random variables. Characteristic functions and their applications. Convergence of sequences of random variables, central limit theorems and weak law of large numbers. Statistical inference: estimation of parameters, maximal likelihood estimates, hypothesis testing. Neyman Pearson lemma. Regression models: least squares and maximal likelihood estimation of parameters. Goodness of fit tests.

Recommended literature:
Janková, K., Pázman, A.: Pravdepodobnosť a štatistika, Vydavateľstvo UK 2011
K. Zvára, J. Štěpán: Pravděpodobnost a matematická statistika, Matfzypress 1997
Harman, R., Honschová, E., Somorčík, J.: Zbierka úloh zo základov teórie pravdepodobnosti, Paci Bratislava 2009
G.R.Grimmett, D. Stirzaker: Probability and Random Processes. Oxford University Press 2001

Languages necessary to complete the course:
Slovak, English

Notes:

Past grade distribution
Total number of evaluated students: 1502

A	B	C	D	E	FX
18,44	10,45	15,31	19,91	27,63	8,26

Lecturers: doc. RNDr. Katarína Janková, CSc., Mgr. Erika Lejtrich

Last change: 09.03.2022

Approved by: prof. RNDr. Ján Filo, CSc.

COURSE DESCRIPTION

Academic year: 2025/2026

University: Comenius University Bratislava

Faculty: Faculty of Mathematics, Physics and Informatics

Course ID:	**Course title:**
FMFI.KAG/1-MAT-760/15	Professional Graphical Software (1)

Educational activities:
Type of activities: lecture / practicals
Number of hours:
per week: 2 / 2 **per level/semester:** 26 / 26
Form of the course: on-site learning

Number of credits: 5

Recommended semester: 5.

Educational level: I.

Prerequisites:

Course requirements:
For the semester, the student can get 100% for continuous assessment in the form of independent work on individual projects.
Evaluation: A (100-91), B (90-81), C (80-71), D (70-61), E (60-51), Fx (50-0).

Learning outcomes:
After completing the course, students will be able to create and edit complex bitmap or vector drawings and 3D models and their animations in multiplatform Open Source programs Gimp, Inkscape and Blender. Such images, drawings and possibly 3D models are often part of the final documents such as thesis.

Class syllabus:
1. Creating simple graphics, logos and animations using a graphics tablet in GIMP.
2. Advanced editing of photos (working with layers, masks, etc.) and scanned documents, overview of interesting extensions in Gimp.
3. Creating vector graphics using various tools in Inkscape.
4. Advanced tools (tile clones, filters, transformations) and the use of Inkscape extensions to create more complex vector artwork.
5. Creating simple 3D objects using standard tools. Setting up materials, lights, scenes, surroundings and cameras in Blender.
6. Use of spline surfaces and lattice deformation in the creation of 3D animal models.
7. Creating simple animations of a realistic-looking scene.
8. Creating an animated character using a skeleton and modifying the animation curves in Blender.

Recommended literature:
Josef Vybíral: GIMP – Praktická uživatelská příručka. Computer Press, 2008
Lubomír Čevela: Digitální fotografie v programu GIMP. Computer Press, 2012
Petr Šimčík: Inkscape – Praktický průvodce tvorbou vektorové grafiky. Computer Press, 2013
Dmitry Kirsanov: The Book of Inkscape (2nd Edition), No Starch Press, 2021
Tavmjong Bah: Inkscape – Guide to a Vector Drawing Program (4th Edition). Prentice Hall, 2011
Pavel Pokorný: Blender – Naučte se 3D grafiku. BEN - technická literatura, 2009

Jason van Gumster: Blender For Dummies (4th Edition). Wiley, 2020

Languages necessary to complete the course:

Notes:

Past grade distribution
Total number of evaluated students: 70

A	B	C	D	E	FX
32,86	28,57	15,71	2,86	12,86	7,14

Lecturers: RNDr. Róbert Bohdal, PhD., doc. RNDr. Andrej Ferko, PhD.

Last change: 24.06.2022

Approved by: prof. RNDr. Ján Filo, CSc.

COURSE DESCRIPTION

Academic year: 2025/2026

University: Comenius University Bratislava

Faculty: Faculty of Mathematics, Physics and Informatics

Course ID:	**Course title:**
FMFI.KAG/1-MAT-830/15	Professional Graphical Software (2)

Educational activities:
Type of activities: lecture / practicals
Number of hours:
per week: 2 / 2 **per level/semester:** 26 / 26
Form of the course: on-site learning

Number of credits: 4

Recommended semester: 6.

Educational level: I.

Prerequisites:

Course requirements:
For the semester, the student can get 100% for continuous assessment in the form of independent work on individual projects.
Evaluation: A (100-91), B (90-81), C (80-71), D (70-61), E (60-51), Fx (50-0).

Learning outcomes:
After completing the course, students will be able to create realistic 3D models of characters and their animations (including facial expressions) in the Blender program. Furthermore, students will get acquainted with the technique of "motion tracking" and "green screen" combining animated 3D model and real video. Graduates of the course will be able to create realistic simulations of fire, water flow, explosion of fireworks and similar effects using particle systems.

Class syllabus:
1. Creation a realistic 3D human model using the MakeHuman plugin to import the model into Blender.
2. Creation an animation of a walking or running 3D human model using a skeleton and transfer the created motion to another 3D model.
3. Import of "motion capture" data containing the skeleton and human movement on your own 3D character model.
4. Basics of "motion tracking" technique and its use for inserting an animated 3D model into a video (creation of visual effects).
5. Replacing the virtual background with your own 3D scene or video using the green screen.
6. Overview of particle systems, their use and possibilities.
7. Creation of realistic fireworks.
8. Simulation of combustion using particle systems.
9. Realistic simulation of running water and other fluids.

Recommended literature:
Pavel Pokorný: Blender – Naučte se 3D grafiku. BEN - technická literatura, 2009
Jason van Gumster: Blender For Dummies (4th Edition). Wiley, 2020
Oliver Villar: Learning Blender. Pearson Education, 2020

Oscar Baechler, Xury Greer: Blender 3D By Example (2nd Edition). Packt Publishing, 2020
Beginner's Guide to Creating Characters in Blender. 3DTotal Publishing, 2021

Languages necessary to complete the course:

Notes:

Past grade distribution
Total number of evaluated students: 28

A	B	C	D	E	FX
17,86	10,71	25,0	32,14	7,14	7,14

Lecturers: RNDr. Róbert Bohdal, PhD., doc. RNDr. Andrej Ferko, PhD.

Last change: 24.06.2022

Approved by: prof. RNDr. Ján Filo, CSc.

COURSE DESCRIPTION

Academic year: 2025/2026

University: Comenius University Bratislava

Faculty: Faculty of Mathematics, Physics and Informatics

Course ID:	**Course title:**
FMFI.KDMFI/1-MAT-130/22	Programming (1)

Educational activities:
Type of activities: lecture / practicals
Number of hours:
per week: 2 / 2 **per level/semester:** 26 / 26
Form of the course: on-site learning

Number of credits: 5

Recommended semester: 1.

Educational level: I.

Prerequisites:

Course requirements:
Active work on practice lessons at which a student solve assigned tasks is required. At least 80% of completed practice lessons are need to be admitted to the final examination. During the final examination, the student solves a practical assignment on a computer and according to obtained score, he/she receives a grade: A (90%), B (80%), C (70%), D (60%), E (50%) or FX (less than 50%).
Scale of assessment (preliminary/final): 0/100

Learning outcomes:
Students are able to solve problems algorithmically, to process large number of data and to communicate with the user using basic constructions and data types of programming language Python.

Class syllabus:
Expressions and variables.
Loops.
Program branching.
Subroutines and functions.
List.
Solving mathematical and geometrical problems.
User interaction.

Recommended literature:
Salanci, L.: www.salanci.sk - web page with lectures and exercises

Languages necessary to complete the course:
Slovak, English

Notes:

Past grade distribution Total number of evaluated students: 1040					
A	B	C	D	E	FX
51,15	9,23	6,15	6,44	8,37	18,65
Lecturers: doc. RNDr. Ľubomír Salanci, PhD.					
Last change: 22.02.2023					
Approved by: prof. RNDr. Ján Filo, CSc.					

COURSE DESCRIPTION

Academic year: 2025/2026

University: Comenius University Bratislava

Faculty: Faculty of Mathematics, Physics and Informatics

Course ID:	**Course title:**
FMFI.KDMFI/1-MAT-170/22	Programming (2)

Educational activities:
Type of activities: lecture / practicals
Number of hours:
per week: 2 / 2 **per level/semester:** 26 / 26
Form of the course: on-site learning

Number of credits: 5

Recommended semester: 2.

Educational level: I.

Prerequisites: FMFI.KDMFI/1-MAT-130/22 - Programming (1) or FMFI.KDMFI/1-MAT-130/14 - Programming (1)

Recommended prerequisites:
Programming 1

Course requirements:
Active work on practice lessons at which a student solve assigned tasks is required. At least 80% of completed practice lessons are need to be admitted to the final examination. During the final examination, the student solves a practical assignment on a computer and according to obtained score, he/she receives a grade: A (90%), B (80%), C (70%), D (60%), E (50%) or FX (less than 50%).
Scale of assessment (preliminary/final): 0/100

Learning outcomes:
Using object-oriented programming in the Python programming language, students are able to solve problems algorithmically, process structured data and interact with the user.

Class syllabus:
Strings.
Objects.
Many objects.
Turtle graphics.
Recursion.
Files,
Solving mathematical and geometrical problems.
User interaction.

Recommended literature:
Salanci, L.: www.salanci.sk - web page with lectures and exercises

Languages necessary to complete the course:
Slovak, English

Notes:

Past grade distribution Total number of evaluated students: 1958					
A	B	C	D	E	FX
34,83	16,5	12,21	12,41	17,52	6,54
Lecturers: doc. RNDr. Ľubomír Salanci, PhD.					
Last change: 22.02.2023					
Approved by: prof. RNDr. Ján Filo, CSc.					

COURSE DESCRIPTION

Academic year: 2025/2026

University: Comenius University Bratislava

Faculty: Faculty of Mathematics, Physics and Informatics

Course ID:	**Course title:**
FMFI.KDMFI/1-MAT-756/00	Programming (3)

Educational activities:
Type of activities: lecture / practicals
Number of hours:
per week: 2 / 2 **per level/semester:** 26 / 26
Form of the course: on-site learning

Number of credits: 5

Recommended semester: 3.

Educational level: I.

Prerequisites: FMFI.KDMFI/1-MAT-170/22 - Programming (2) or FMFI.KDMFI/1-MAT-170/00 - Programming (2)

Course requirements:
Scale of assessment (preliminary/final): 65/35

Learning outcomes:

Class syllabus:
Polymorphism
Data structures: hash table, queue, stack, linked list, tree, graph
Algorithms: concerning data structures, searching, sorting, backtracking
Thinking about complexity

Recommended literature:
Andrew Koenig, Barbara E. Moo: Rozumíme C++; Computer Press 2003
Miroslav Virius: Pasti a propasti jazyka C++; Grada 1997
Lectures are published on the internet: www.salanci.sk/c

Languages necessary to complete the course:

Notes:

Past grade distribution
Total number of evaluated students: 63

A	B	C	D	E	FX
57,14	14,29	9,52	4,76	9,52	4,76

Lecturers: doc. RNDr. Ľubomír Salanci, PhD.

Last change: 02.06.2015

Approved by: prof. RNDr. Ján Filo, CSc.

COURSE DESCRIPTION

Academic year: 2025/2026

University: Comenius University Bratislava

Faculty: Faculty of Mathematics, Physics and Informatics

Course ID:	**Course title:**
FMFI.KJP/1-MXX-161/00	Russian Language (1)

Educational activities:
Type of activities: practicals
Number of hours:
per week: 2 **per level/semester:** 26
Form of the course: on-site learning

Number of credits: 2

Recommended semester: 1.

Educational level: I., I.II., II.

Prerequisites:

Course requirements:
Scale of assessment (preliminary/final): 100/0

Learning outcomes:
Basic communication in Russian, developing other Russian language skills - listening comprehension, reading and writing.

Class syllabus:
To master the fundamentals of general Russian. The language level is A1.
Learning the Cyrillic (Russian) alphabet, gaining basic language competence, building up skills and confidence in dealing with unfamiliar authentic and semi-authentic texts.
The subject provides a course in Russian language for beginners.

Recommended literature:
The textbook: : Точка Ру A1 (Ольга Долматова, Екатерина Новачац), pracovné karty Падежи 1 (Л.С. Безкоровайная, В.Е. Штыленко).

Languages necessary to complete the course:

Notes:

Past grade distribution
Total number of evaluated students: 738

A	B	C	D	E	FX
57,86	16,53	10,98	4,2	1,76	8,67

Lecturers: Viktoria Mirsalova

Last change: 20.06.2022

Approved by: prof. RNDr. Ján Filo, CSc.

COURSE DESCRIPTION

Academic year: 2025/2026

University: Comenius University Bratislava

Faculty: Faculty of Mathematics, Physics and Informatics

Course ID:	**Course title:**
FMFI.KJP/1-MXX-162/00	Russian Language (2)

Educational activities:
Type of activities: practicals
Number of hours:
per week: 2 **per level/semester:** 26
Form of the course: on-site learning

Number of credits: 2

Recommended semester: 2.

Educational level: I., I.II., II.

Prerequisites:

Course requirements:
Scale of assessment (preliminary/final): 100/0

Learning outcomes:
Basic communication in Russian, developing other Russian language skills - listening comprehension, reading and writing.

Class syllabus:
To master the fundamentals of general Russian.
Learning the Cyrillic (Russian) alphabet, gaining basic language competence, building up skills and confidence in dealing with unfamiliar authentic and semi-authentic texts.
The subject continues the program of Russian language (1) and provides a course of Russian for beginners.

Recommended literature:
Textbook: Точка Ру A1 (Ольга Долматова, Екатерина Новачац), pracovné karty Падежи 1 (Л.С. Безкоровайная, В.Е. Штыленко).

Languages necessary to complete the course:

Notes:

Past grade distribution
Total number of evaluated students: 435

A	B	C	D	E	FX
63,91	16,09	8,97	3,91	0,92	6,21

Lecturers: Viktoria Mirsalova

Last change: 20.06.2022

Approved by: prof. RNDr. Ján Filo, CSc.

COURSE DESCRIPTION

Academic year: 2025/2026

University: Comenius University Bratislava

Faculty: Faculty of Mathematics, Physics and Informatics

Course ID:	**Course title:**
FMFI.KJP/1-MXX-261/00	Russian Language (3)

Educational activities:
Type of activities: practicals
Number of hours:
per week: 2 **per level/semester:** 26
Form of the course: on-site learning

Number of credits: 2

Recommended semester: 3.

Educational level: I., I.II., II.

Prerequisites:

Course requirements:
Scale of assessment (preliminary/final): 100/0

Learning outcomes:
Basic communication in Russian, developing other Russian language skills - listening comprehension, reading and writing.

Class syllabus:
Learning the handwritten Russian (Russian Cursive Cyrillic), developing further language skills, gaining knowledge of Russian culture, history and way of life, pre-intermediate to intermediate grammar and vocabulary.
The course "Russian for Intermediate Students" is a follow-up to "Russian for Beginners". The subject of the course is general Russian in the range appropriate to the given level.

Recommended literature:
Точка Ру A2 (Ольга Долматова, Екатерина Новачац) a Short Stories in Russian (Olly Richards, Alex Rowlings)

Languages necessary to complete the course:

Notes:

Past grade distribution
Total number of evaluated students: 212

A	B	C	D	E	FX
69,34	17,92	8,96	2,36	0,0	1,42

Lecturers: Viktoria Mirsalova

Last change: 20.06.2022

Approved by: prof. RNDr. Ján Filo, CSc.

COURSE DESCRIPTION

Academic year: 2025/2026

University: Comenius University Bratislava

Faculty: Faculty of Mathematics, Physics and Informatics

Course ID:	**Course title:**
FMFI.KJP/1-MXX-262/00	Russian Language (4)

Educational activities:
Type of activities: practicals
Number of hours:
per week: 2 **per level/semester:** 26
Form of the course: on-site learning

Number of credits: 2

Recommended semester: 4.

Educational level: I., I.II., II.

Prerequisites:

Course requirements:
Scale of assessment (preliminary/final): 100/0

Learning outcomes:
Learning the handwritten Russian (Russian Cursive Cyrillic), developing further language skills, gaining knowledge of Russian culture, history and way of life, pre-intermediate to intermediate grammar and vocabulary.

Class syllabus:
Learning the handwritten Russian (Russian Cursive Cyrillic), developing further language skills, gaining knowledge of Russian culture, history and way of life, pre-intermediate to intermediate grammar and vocabulary.
The course "Russian for Intermediate Students" is a follow-up to "Russian for Beginners". The subject of the course is general Russian in the range appropriate to the given level.

Recommended literature:
Точка Ру A2 (Ольга Долматова, Екатерина Новачац) a Short Stories in Russian (Olly Richards, Alex Rowlings)

Languages necessary to complete the course:

Notes:

Past grade distribution
Total number of evaluated students: 153

A	B	C	D	E	FX
74,51	14,38	7,19	2,61	0,65	0,65

Lecturers: Viktoria Mirsalova

Last change: 20.06.2022

Approved by: prof. RNDr. Ján Filo, CSc.

COURSE DESCRIPTION

Academic year: 2025/2026

University: Comenius University Bratislava

Faculty: Faculty of Mathematics, Physics and Informatics

Course ID:	**Course title:**
FMFI.KAMŠ/1-PMA-760/00	Sampling Theory

Educational activities:
Type of activities: lecture
Number of hours:
per week: 2 **per level/semester:** 26
Form of the course: on-site learning

Number of credits: 3

Recommended semester: 5.

Educational level: I.

Prerequisites: FMFI.KAMŠ/1-MAT-282/00 - Probability and Statistics (2) or FMFI.KAMŠ/1-DAV-201/20 - Fundamentals of Probability and Statistics

Course requirements:
Preliminary semester evaluation: test
Final examination: written examination
Approximate grade thresholds: A 90%, B 80%, C 70%, D 60%, E 50%

Learning outcomes:
The student will master basic sampling schemes used in sampling from a finite population. He will be able to find interval estimates for unknown population parameters.

Class syllabus:
Simple random sampling, sampling without and with replacement. Estimate of population mean and proportion. Stratified random sampling. Stratification with proportional allocation. Optimum allocation, Neyman allocation. Systematic sampling. Elements of probabilistic random sampling. Inclusion probabilities, Horwitz-Thompson estimate and its properties. Bernoulli sampling, Poisson sampling.

Recommended literature:
Kalas, J.: Vybrané kapitoly z teórie náhodného výberu, skriptá MFF UK Bratislava 1996.
Cochran, W.G. Sampling techniques, Wiley and Sons, New York,1977.
Särndal, C. E., Swensson, B., Wretman, J.: Model Assisted Survey Sampling, Springer 1992.

Languages necessary to complete the course:

Notes:

Past grade distribution
Total number of evaluated students: 140

A	B	C	D	E	FX
27,86	18,57	20,0	15,71	10,71	7,14

Lecturers: doc. RNDr. Katarína Janková, CSc.

Last change: 26.11.2021
Approved by: prof. RNDr. Ján Filo, CSc.

COURSE DESCRIPTION

Academic year: 2025/2026

University: Comenius University Bratislava

Faculty: Faculty of Mathematics, Physics and Informatics

Course ID:	**Course title:**
FMFI.KAI/2-IKVa-192/19	Science, Technology and Humanity: Opportunities and Risks

Educational activities:
Type of activities: seminar
Number of hours:
per week: 3 **per level/semester:** 39
Form of the course: on-site learning

Number of credits: 5

Recommended semester: 2.

Educational level: I., I.II., II.

Prerequisites:

Course requirements:
Semestral evaluation: active participation
Final evaluation: essay
Weight of the final evaluation: 60%
To achieve an A, 90% is needed, for B at least 80%, for C 70%, for D, 60% and for an E, at least 50% of overall assessment.

Learning outcomes:
The students will gain awareness of the contemporary and potential future challenges posed by scientific and technological innovations and their impact on human behaviour, culture and society.

Class syllabus:
Big data: privacy, politics and power,
Internet of things, it usefulness and threats,
Assistant AI and its place in future society,
Job market and inequality,
Enhancements and human rights and the right to change self and others,
Initiatives for responsible research,
Artificial minds,
Hybridization between species and between AI and organic minds,
Future of minds and trans-humanism,
Artificial emotional intelligence,
An after human era.

Recommended literature:
- S. Russell: Human compatible. Artificial intelligence and the problem of control. Viking, 2019.
- J. Havens: Heartificial intelligence. Embracing our humanity to maximize machines. Penguin, 2016.
- P. Boddington: Towards a code of ethics for artificial intelligence. Springer, 2017.
- M. Shanahan: The technological singularity. MIT Press, 2015.

- C. MacKellar, C.: Cyborg Mind: What Brain–Computer and Mind–Cyberspace Interfaces Mean for Cyberneuroethics. Berghahn Books, 2019.
- G. Bel, J. Gemmell: Total Recall, How the e-Memory Revolution will change everything. Dutton, 2009.
- S. Zuboff: The Age of Surveillance Capitalism: The Fight for a Human Future at the New Frontier of Power. PublicAffairs, 2019.
- C. O'Neil: Weapons of Math Destruction: How Big Data Increases Inequality and Threatens Democracy. Crown Publishers, 2016.
- M. Tegmark: Life 3.0. Allen Lane, 2017.

Languages necessary to complete the course:
English

Notes:

Past grade distribution
Total number of evaluated students: 146

A	B	C	D	E	FX
40,41	21,92	16,44	6,85	4,79	9,59

Lecturers: doc. RNDr. Martin Takáč, PhD., PhDr. Ing. Tomáš Gál, PhD.

Last change: 28.02.2020

Approved by: prof. RNDr. Ján Filo, CSc.

COURSE DESCRIPTION

Academic year: 2025/2026

University: Comenius University Bratislava

Faculty: Faculty of Mathematics, Physics and Informatics

Course ID:	**Course title:**
FMFI.KMANM/1-MAT-770/15	Seminar in TEX

Educational activities:
Type of activities: seminar
Number of hours:
per week: 2 **per level/semester:** 26
Form of the course: on-site learning

Number of credits: 2

Recommended semester: 3.

Educational level: I.

Prerequisites:

Course requirements:
Ongoing assessment: 10 individual tasks 5 points each
Exam: individual work, rewriting the specified text for 50 points
Indicative assessment scale: A 90%, B 80%, C 70%, D 60%, E 50%
Scale of assessment (preliminary/final): 50/50

Learning outcomes:
Mastering the MikTeX or LaTeX compiler for writing professional texts. Introduction to editors for creating such texts.

Class syllabus:
1. Visualization of a tex file, error messages
2. Basic structure of a tex file, commands and environments, organization of different types of documents
3. Styles and font sizes, tables writing, footnotes
4. Mathematical formulas, creating simple pictures and inserting external pictures
5. Literature writing, index creation, slides
6. Creation of special documents (presentation, letter, ...)

Recommended literature:
Teacher’s own electronic texts published through web documents.

Languages necessary to complete the course:
Slovak, English

Notes:

Past grade distribution
Total number of evaluated students: 81

A	B	C	D	E	FX
65,43	16,05	8,64	1,23	4,94	3,7

Lecturers: RNDr. Michal Pospíšil, PhD.
Last change: 17.06.2022
Approved by: prof. RNDr. Ján Filo, CSc.

COURSE DESCRIPTION

Academic year: 2025/2026

University: Comenius University Bratislava

Faculty: Faculty of Mathematics, Physics and Informatics

Course ID:	**Course title:**
FMFI.KJP/1-MXX-171/20	Slovak Language for Foreign Students (1)

Educational activities:
Type of activities: practicals
Number of hours:
per week: 2 **per level/semester:** 26
Form of the course: on-site learning

Number of credits: 2

Recommended semester: 1.

Educational level: I., I.II., II., III.

Prerequisites:

Course requirements:
tests
Course prerequisites:
https://fmph.uniba.sk/microsites/kjp/katedra-jazykovej-pripravy/poziadavky-na-udelenie-priebezneho-hodnotenia-aj1aj2aj3-ostatne-kurzy/
Scale of assessment (preliminary/final): 100/0

Learning outcomes:
This course is aimed for foreign students to learn the fundamentals of the Slovak language with the focus on basic communication as well as all other language skills- listening comprehension,reading and writing.

Class syllabus:
The sylabus is targeted at the comprehension of the basics of the Slovak language for the absolute beginners (A1).

Recommended literature:
Krížom- Krážom Slovenčina 1, additional material to further support the covered topics.

Languages necessary to complete the course:

Notes:

Past grade distribution
Total number of evaluated students: 113

A	ABS	B	C	D	E	FX	NEABS
32,74	23,89	8,85	6,19	0,88	0,0	24,78	2,65

Lecturers: Mgr. Aneta Barnes

Last change: 21.06.2022

Approved by: prof. RNDr. Ján Filo, CSc.

COURSE DESCRIPTION

Academic year: 2025/2026

University: Comenius University Bratislava

Faculty: Faculty of Mathematics, Physics and Informatics

Course ID:	**Course title:**
FMFI.KJP/1-MXX-172/20	Slovak Language for Foreign Students (2)

Educational activities:
Type of activities: practicals
Number of hours:
per week: 2 **per level/semester:** 26
Form of the course: on-site learning

Number of credits: 2

Recommended semester: 2.

Educational level: I., I.II., II., III.

Prerequisites:

Course requirements:
tests
Course prerequisites:
https://fmph.uniba.sk/microsites/kjp/katedra-jazykovej-pripravy/poziadavky-na-udelenie-priebezneho-hodnotenia-aj1aj2aj3-ostatne-kurzy/
Scale of assessment (preliminary/final): 100/0

Learning outcomes:
This course is aimed for foreign students to learn the fundamentals of the Slovak language with the focus on basic communication as well as all other language skills- listening comprehension,reading and writing.

Class syllabus:
The sylabus is targeted at the comprehension of the basics of the Slovak language for the absolute beginners (A1) and this course is a follow up course to the Slovak language course 1.

Recommended literature:
Krížom- Krážom Slovenčina 1, additional material to further support the covered topics

Languages necessary to complete the course:

Notes:

Past grade distribution
Total number of evaluated students: 86

A	ABS	B	C	D	E	FX	NEABS
62,79	18,6	1,16	1,16	0,0	0,0	9,3	6,98

Lecturers: Mgr. Aneta Barnes

Last change: 21.06.2022

Approved by: prof. RNDr. Ján Filo, CSc.

COURSE DESCRIPTION

Academic year: 2025/2026

University: Comenius University Bratislava

Faculty: Faculty of Mathematics, Physics and Informatics

Course ID:	**Course title:**
FMFI.KJP/1-MXX-271/20	Slovak Language for Foreign Students (3)

Educational activities:
Type of activities: practicals
Number of hours:
per week: 2 **per level/semester:** 26
Form of the course: on-site learning

Number of credits: 2

Recommended semester: 3.

Educational level: I., I.II., II., III.

Prerequisites:

Course requirements:
tests
Course prerequisites:
https://fmph.uniba.sk/microsites/kjp/katedra-jazykovej-pripravy/poziadavky-na-udelenie-priebezneho-hodnotenia-aj1aj2aj3-ostatne-kurzy/
Scale of assessment (preliminary/final): 100/0

Learning outcomes:
This course is aimed for foreign students to better comprehend all the language skills important to enable correct usage of the Slovak language – listening comprehension, reading, writing and speaking.

Class syllabus:
The sylabus is targeted at the comprehension of all the language skills of the Slovak language , and it is a follow up course to the Slovak language course 2.

Recommended literature:
Krížom-Krážom Slovenčina 2, additional material to further support the covered topics.

Languages necessary to complete the course:

Notes:

Past grade distribution
Total number of evaluated students: 32

A	ABS	B	C	D	E	FX	NEABS
59,38	3,13	18,75	3,13	3,13	0,0	12,5	0,0

Lecturers: Mgr. Aneta Barnes

Last change: 21.06.2022

Approved by: prof. RNDr. Ján Filo, CSc.

COURSE DESCRIPTION

Academic year: 2025/2026

University: Comenius University Bratislava

Faculty: Faculty of Mathematics, Physics and Informatics

Course ID:	**Course title:**
FMFI.KJP/1-MXX-272/20	Slovak Language for Foreign Students (4)

Educational activities:
Type of activities: practicals
Number of hours:
per week: 2 **per level/semester:** 26
Form of the course: on-site learning

Number of credits: 2

Recommended semester: 4.

Educational level: I., I.II., II., III.

Prerequisites:

Course requirements:
tests
Course prerequisites:
https://fmph.uniba.sk/microsites/kjp/katedra-jazykovej-pripravy/poziadavky-na-udelenie-priebezneho-hodnotenia-aj1aj2aj3-ostatne-kurzy/
Scale of assessment (preliminary/final): 100/0

Learning outcomes:
This course is aimed for foreign students to better comprehend all the language skills important to enable correct usage of the Slovak language – listening comprehension, reading, writing and speaking.

Class syllabus:
The sylabus is targeted at the comprehension of all the language skills of the Slovak language , and it is a follow up course to the Slovak language course 3.

Recommended literature:
Krížom-Krážom Slovenčina 2, additional material to further support the covered topics.

Languages necessary to complete the course:

Notes:

Past grade distribution
Total number of evaluated students: 25

A	ABS	B	C	D	E	FX	NEABS
84,0	0,0	4,0	4,0	0,0	0,0	8,0	0,0

Lecturers: Mgr. Aneta Barnes

Last change: 21.06.2022

Approved by: prof. RNDr. Ján Filo, CSc.

COURSE DESCRIPTION

Academic year: 2025/2026

University: Comenius University Bratislava

Faculty: Faculty of Mathematics, Physics and Informatics

Course ID:	**Course title:**
FMFI.KMANM/1-MAT-733/19	Software MATLAB

Educational activities:
Type of activities: practicals
Number of hours:
per week: 2 **per level/semester:** 26
Form of the course: on-site learning

Number of credits: 2

Recommended semester: 3.

Educational level: I., I.II., II.

Prerequisites:

Antirequisites: FMFI.KMANM/1-MAT-731/00 and FMFI.KMANM/1-MAT-732/00

Course requirements:
Continuous assessment: activity
Examination: group project, practical computer exam
Scale of assessment (preliminary/final): 20/80

Learning outcomes:
Students will learn the basics of using MATLAB software. They will be able to use MATLAB to calculate some mathematical problems, read files or write to files, plot computed data, create complex functions for reuse and create a graphical user interface GUI for their programs.

Class syllabus:
Format and conversion of variables, vectors and matrices
Programming environment, so-called M-file
Reading from a file and protting data
Creating functions
Graphical GUI environment

Recommended literature:
MATLAB - SIMULINK I / Stefan Kozak, Slavomir Kajan. Bratislava: Slovak University of Technology, 1999 Matlab / Jela Babušíková. Bratislava: FMFI UK Library and Publishing Center, 2007
Kozák Š., Kajan S., Matlab - Simulink, 1. Slovak University of Technology in Bratislava, 1999. ISBN Dušek F., MatLab and Simulink, University of Pardubice, 2000
mathworks.com/help

Languages necessary to complete the course:
slovak

Notes:

Past grade distribution Total number of evaluated students: 139					
A	B	C	D	E	FX
21,58	12,95	14,39	12,95	18,71	19,42
Lecturers: RNDr. Patrik Mihala, PhD.					
Last change: 15.03.2022					
Approved by: prof. RNDr. Ján Filo, CSc.					

COURSE DESCRIPTION

Academic year: 2025/2026

University: Comenius University Bratislava

Faculty: Faculty of Mathematics, Physics and Informatics

Course ID:	**Course title:**
FMFI.KTV/1-MXX-115/15	Sports in Nature (1)

Educational activities:
Type of activities:
Number of hours:
per week: **per level/semester:**
Form of the course: on-site learning

Number of credits: 2

Recommended semester: 1.

Educational level: I., I.II.

Prerequisites:

Course requirements:
Grades: A 90%, B 80%, C 70%, D 60%, E 50%.
The condition for the award of 1 or 2 credits is the completion of a multi-day course in its full scope, or the completion of one-day courses in the scope of 4 days. Candidates can apply to the leaders of individual courses. From the presented offer of courses, you can choose the one that suits your interests, abilities and deadlines.

Learning outcomes:
Acquisition and development of basic motor skills and abilities in selected sports: skiing and snowboarding. Mastering the correct technique of performing individual movements, which are necessary for skiing and snowboarding.

Class syllabus:
The student can sign up for the outdoor sports courses offered by the department: skiing, snowboarding and other hobby sports. The lessons in the courses are focused on the development of basic and special movement skills and, mastering the techniques needed for the sports.

Recommended literature:

Languages necessary to complete the course:
Slovak

Notes:
KTVŠ does not rent ski equipment.

Past grade distribution
Total number of evaluated students: 300

A	B	C	D	E	FX
99,0	0,33	0,33	0,0	0,0	0,33

Lecturers: Mgr. Martin Dovičák, PhD., Mgr. Tomáš Kuchár, PhD., Mgr. Jana Leginusová, PaedDr. Dana Mašlejová, Mgr. Ladislav Mókus, PaedDr. Mikuláš Ortutay, Mgr. Júlia Raábová, PhD., Mgr. Tomáš Lovecký

Last change: 16.06.2022
Approved by: prof. RNDr. Ján Filo, CSc.

COURSE DESCRIPTION

Academic year: 2025/2026

University: Comenius University Bratislava

Faculty: Faculty of Mathematics, Physics and Informatics

Course ID:	**Course title:**
FMFI.KTV/1-MXX-215/15	Sports in Nature (2)

Educational activities:
Type of activities:
Number of hours:
per week: **per level/semester:**
Form of the course: on-site learning

Number of credits: 2

Recommended semester: 2.

Educational level: I., I.II.

Prerequisites:

Course requirements:
Grades: A 90%, B 80%, C 70%, D 60%, E 50%
The condition for the award of 1 or 2 credits is the completion of a multi-day course in its full scope, or the completion of one-day courses in the scope of 4 days. Candidates can apply to the leaders of individual courses. From the presented offer of courses, you can choose the one that suits your interests, abilities and deadlines.

Learning outcomes:
Creating a positive and lasting relationship with physical activity. Acquisition and mastery of basic motor skills and abilities in outdoor sports: windsurfing, beach volleyball, water tourism - river rafting, hiking and other sports according to interest. Training and improving the technique needed for the sports.

Class syllabus:
The student can sign up for the outdoor sports courses offered by the department: water tourism - river rafting, windsurfing, beach volleyball, hiking and other hobby sports. The lessons in the courses are focused on the development of basic and special movement skills and, mastering the techniques needed for the sports.

Recommended literature:

Languages necessary to complete the course:
Slovak

Notes:
KTVŠ will provide sports equipment.

Past grade distribution
Total number of evaluated students: 297

A	B	C	D	E	FX
92,59	0,0	0,0	0,0	0,34	7,07

Lecturers: Mgr. Martin Dovičák, PhD., Mgr. Tomáš Kuchár, PhD., Mgr. Jana Leginusová, PaedDr. Dana Mašlejová, Mgr. Ladislav Mókus, PaedDr. Mikuláš Ortutay, Mgr. Júlia Raábová, PhD., Mgr. Tomáš Lovecký
Last change: 16.06.2022
Approved by: prof. RNDr. Ján Filo, CSc.

COURSE DESCRIPTION

Academic year: 2025/2026

University: Comenius University Bratislava

Faculty: Faculty of Mathematics, Physics and Informatics

Course ID:	**Course title:**
FMFI.KTV/1-MXX-216/18	Sports in Nature (3)

Educational activities:
Type of activities:
Number of hours:
per week: **per level/semester:**
Form of the course: on-site learning

Number of credits: 1

Recommended semester: 3.

Educational level: I., I.II.

Prerequisites:

Antirequisites: FMFI.KTV/1-UXX-151/22

Course requirements:
Grades: A 90%, B 80%, C 70%, D 60%, E 50%
The condition for the award of 1 or 2 credits is the completion of a multi-day course in its full scope, or the completion of one-day courses in the scope of 4 days. Candidates can apply to the leaders of individual courses. From the presented offer of courses, you can choose the one that suits your interests, abilities and deadlines.

Learning outcomes:
Acquisition and development of basic motor skills and abilities in selected sports: skiing and snowboarding. Mastering the correct technique of performing individual movements, which are necessary for skiing and snowboarding.

Class syllabus:
The student can sign up for the outdoor sports courses offered by the department: skiing, snowboarding. The lessons in the courses are focused on the development of basic and special movement skills and, mastering the techniques needed for the sports.

Recommended literature:

Languages necessary to complete the course:
Slovak

Notes:
KTVŠ does not rent ski equipment.

Past grade distribution
Total number of evaluated students: 55

A	B	C	D	E	FX
98,18	0,0	0,0	0,0	0,0	1,82

Lecturers: Mgr. Martin Dovičák, PhD., Mgr. Tomáš Kuchár, PhD., Mgr. Jana Leginusová, PaedDr. Dana Mašlejová, Mgr. Ladislav Mókus, PaedDr. Mikuláš Ortutay, Mgr. Júlia Raábová, PhD., Mgr. Tomáš Lovecký
Last change: 16.06.2022
Approved by: prof. RNDr. Ján Filo, CSc.

COURSE DESCRIPTION

Academic year: 2025/2026

University: Comenius University Bratislava

Faculty: Faculty of Mathematics, Physics and Informatics

Course ID:	**Course title:**
FMFI.KTV/1-MXX-217/18	Sports in Nature (4)

Educational activities:
Type of activities:
Number of hours:
per week: **per level/semester:**
Form of the course: on-site learning

Number of credits: 1

Recommended semester: 4.

Educational level: I., I.II.

Prerequisites:

Antirequisites: FMFI.KTV/1-UXX-152/22

Course requirements:
Grades: A 90%, B 80%, C 70%, D 60%, E 50%
The condition for the award of 1 or 2 credits is the completion of a multi-day course in its full scope, or the completion of one-day courses in the scope of 4 days. Candidates can apply to the leaders of individual courses. From the presented offer of courses, you can choose the one that suits your interests, abilities and deadlines.

Learning outcomes:
Creating a positive and lasting relationship with physical activity. Acquisition and mastery of basic motor skills and abilities in outdoor sports: windsurfing, beach volleyball, water tourism - river rafting, hiking and other sports according to interest. Training and improving the technique needed for the sports.

Class syllabus:
The student can sign up for the outdoor sports courses offered by the department: water tourism - river rafting, windsurfing, beach volleyball, hiking and other hobby sports. The lessons in the courses are focused on the development of basic and special movement skills and, mastering the techniques needed for the sports.

Recommended literature:

Languages necessary to complete the course:
Slovak

Notes:
KTVŠ will provide material equipment.

Past grade distribution
Total number of evaluated students: 40

A	B	C	D	E	FX
90,0	0,0	0,0	0,0	0,0	10,0

Lecturers: Mgr. Martin Dovičák, PhD., Mgr. Tomáš Kuchár, PhD., Mgr. Jana Leginusová, PaedDr. Dana Mašlejová, Mgr. Ladislav Mókus, PaedDr. Mikuláš Ortutay, Mgr. Júlia Raábová, PhD., Mgr. Tomáš Lovecký
Last change: 16.06.2022
Approved by: prof. RNDr. Ján Filo, CSc.

COURSE DESCRIPTION

Academic year: 2025/2026

University: Comenius University Bratislava

Faculty: Faculty of Mathematics, Physics and Informatics

Course ID:	**Course title:**
FMFI.KAMŠ/1-EFM-330/00	Statistical Methods

Educational activities:
Type of activities: lecture
Number of hours:
per week: 2 **per level/semester:** 26
Form of the course: on-site learning

Number of credits: 3

Recommended semester: 5.

Educational level: I.

Prerequisites: FMFI.KAMŠ/1-MAT-282/00 - Probability and Statistics (2)

Recommended prerequisites:
Probability and statistics (2) 1-MAT-282

Course requirements:
written exam
Approximate grade thresholds: A 90%, B 80%, C 70%, D 60%, E 50%
Scale of assessment (preliminary/final): 0/100

Learning outcomes:
Students will be able to apply some basic methods of mathematical statistics, while understanding their principles. They will also understand some general statistical techniques and they will be able to apply them.

Class syllabus:
Properties of sample mean and sample variance. t-tests and F-tests. Basic confidence intervals and the Bonferroni method. How to create a test? How to measure test quality? Neyman-Pearson's lemma and UMP tests for compound hypotheses. How to measure the quality of estimates? BLUE. BUE and its uniqueness. Fisher information and Cramér-Rao inequality. Asymptotic properties of maximum likelihood estimates & tests. Wald test and score test. Bootstrap and jackknife.

Recommended literature:
Casella G, Berger R: Statistical inference. 2nd ed. Cengane Learning 2001;
Anděl J: Základy matematické statistiky. Matfyzpress 2005.

Languages necessary to complete the course:
Slovak, English

Notes:

Past grade distribution
Total number of evaluated students: 710

A	B	C	D	E	FX
40,99	17,04	14,93	12,25	12,39	2,39

Lecturers: Mgr. Ján Somorčík, PhD.
Last change: 11.03.2022
Approved by: prof. RNDr. Ján Filo, CSc.

COURSE DESCRIPTION

Academic year: 2025/2026

University: Comenius University Bratislava

Faculty: Faculty of Mathematics, Physics and Informatics

Course ID:	**Course title:**
FMFI.KJP/1-MXX-133/18	Supplementary English Course (1)

Educational activities:
Type of activities: practicals
Number of hours:
per week: 2 **per level/semester:** 26
Form of the course: on-site learning

Number of credits: 2

Recommended semester: 1.

Educational level: I., I.II.

Prerequisites:

Course requirements:
tests, homework
Scale of assessment (preliminary/final): 100/0 credit - ongoing evaluationMinimum 65 percent of the total points for the assigned work is needed to pass the course. Points can be awarded for attendance, completed homework tasks, and short tests assigned during the course.A 100-93 %B 92-85 %C 84-77 %D 76-70 %E 69-65 %Course prerequisites:https://fmph.uniba.sk/microsites/kjp/katedra-jazykovej-pripravy/poziadavky-na-udelenie-priebezneho-hodnotenia-aj1aj2aj3-ostatne-kurzy/

Learning outcomes:

Class syllabus:
Texts dealing with the most important topics for FMPI majors combining grammar revision with vocabulary needed to pass the A4 English exam.

Recommended literature:
Study materials are created by the teacher and available in electronic form.
Raymond Murphy: Essential Grammar in USe, Cambridge University Press, 1998
Michael McCarthy, Felicity O'Dell: English Vocabulary in Use, Cambridge University Press, 1994

Languages necessary to complete the course:
English

Notes:

Past grade distribution
Total number of evaluated students: 68

A	B	C	D	E	FX
51,47	20,59	7,35	4,41	4,41	11,76

Lecturers: Mgr. Ing. Jana Kočvarová

Last change: 11.04.2024
Approved by: prof. RNDr. Ján Filo, CSc.

COURSE DESCRIPTION

Academic year: 2025/2026

University: Comenius University Bratislava

Faculty: Faculty of Mathematics, Physics and Informatics

Course ID:	**Course title:**
FMFI.KJP/1-MXX-134/18	Supplementary English Course (2)

Educational activities:
Type of activities: practicals
Number of hours:
per week: 2 **per level/semester:** 26
Form of the course: on-site learning

Number of credits: 2

Recommended semester: 2.

Educational level: I., I.II.

Prerequisites:

Course requirements:
tests, homework
Scale of assessment (preliminary/final): 100/0 ENcredit - ongoing evaluation Minimum 65 percent of the total points for the assigned work is needed to pass the course. Points can be awarded for attendance, completed homework tasks, and short tests assigned during the course. A 100-93 % B 92-85 % C 84-77 % D 76-70 % E 69-65 %Course prerequisites:https://fmph.uniba.sk/microsites/kjp/katedra-jazykovej-pripravy/poziadavky-na-udelenie-priebezneho-hodnotenia-aj1aj2aj3-ostatne-kurzy/

Learning outcomes:

Class syllabus:
Texts dealing with the most important topics for FMPI majors combining grammar revision with vocabulary needed to pass the A4 English exam.

Recommended literature:
Study materials are created by the teacher and available in electronic form. Raymond Murphy: Essential Grammar in USe, Cambridge University Press, 1998 Michael McCarthy, Felicity O'Dell: English Vocabulary in Use, Cambridge University Press, 1994

Languages necessary to complete the course:
English

Notes:

Past grade distribution
Total number of evaluated students: 72

A	B	C	D	E	FX
54,17	13,89	4,17	8,33	5,56	13,89

Lecturers: Mgr. Ing. Jana Kočvarová

Last change: 11.04.2024

Approved by: prof. RNDr. Ján Filo, CSc.

COURSE DESCRIPTION

Academic year: 2025/2026

University: Comenius University Bratislava

Faculty: Faculty of Mathematics, Physics and Informatics

Course ID:	**Course title:**
FMFI.KMANM/1-MAT-416/19	Theory of Complex Variable Functions

Educational activities:
Type of activities: course
Number of hours:
per week: 4 **per level/semester:** 52
Form of the course: on-site learning

Number of credits: 5

Recommended semester: 6.

Educational level: I.

Prerequisites:

Recommended prerequisites:
1-MAT-110 Mathematical analysis (1), 1-MAT-150 Mathematical analysis (2)

Course requirements:
Evaluation during semester: 2 written tests 20 pints each.
Final exam: written (40 points) and oral form (20 points).
Requirements for the final exam: 20 points minimum from semestral evaluation.
100 - 90 % A
89 - 80 % B
79 - 70 % C
69 - 60 % D
59 - 50 % E
less than 50 % FX
Scale of assessment (preliminary/final): 40/60

Learning outcomes:
Students will gain basic knowledge in the field of complex analysis.

Class syllabus:
Complex numbers, complex plane. Stereographic projection. Paths, curves. Connected and linearly connected sets. The concept of convergence, limits, continuity and differentiability of functions of a complex variable. Conformal mappings. Curve integral of a function of complex variable. Closed paths integration theorems. Taylor and Laurent series. Properties of holomorphic functions. Isolated singular points of holomorphic functions. Residues and calculation of improper integrals. The argument principle and Rouche's theorem. Open mapping theorem.

Recommended literature:
Б.В. Шабат: ВВЕДЕНИЕ В КОМПЛЕКСНЫЙ АНАЛИЗ (in russian) - Shabat: Introduction to complex analysis (in english)

Languages necessary to complete the course:

slovak, english or russian

Notes:
It is recommended to follow courses 1-MAT-210 Mathematical analysis (3), 1-MAT-250 Mathematical analysis (4) a 1-MAT-801 Topology along with this course

Past grade distribution
Total number of evaluated students: 92

A	B	C	D	E	FX
16,3	9,78	10,87	15,22	18,48	29,35

Lecturers: Mgr. Július Pačuta, PhD., doc. RNDr. Eugen Viszus, CSc.

Last change: 16.06.2022

Approved by: prof. RNDr. Ján Filo, CSc.

COURSE DESCRIPTION

Academic year: 2025/2026

University: Comenius University Bratislava

Faculty: Faculty of Mathematics, Physics and Informatics

Course ID:	**Course title:**
FMFI.KMANM/1-MAT-785/15	Theory of Measure and Integral

Educational activities:
Type of activities: lecture / practicals
Number of hours:
per week: 2 / 2 **per level/semester:** 26 / 26
Form of the course: on-site learning

Number of credits: 5

Recommended semester: 5.

Educational level: I.

Prerequisites: FMFI.KMANM/1-MAT-150/00 - Mathematical Analysis (2)

Recommended prerequisites:
1-MAT-250 Mathematical analysis (4)

Course requirements:
Preliminary evaluation: 1 written partial exam (50%), home work (50%)
Final exam: written (55%)/oral (45%)
Indicative evaluation scale: A 90%, B 80%, C 70%, D65%, E 55%
Scale of assessment (preliminary/final): 40/60

Learning outcomes:
After completing the course, students will gain basic knowledge and skills for using of Lebesgue measure and integral in problems of functional analysis, probability theory and statistics and boundary-value problems of partial differential equations.

Class syllabus:
Lebesgue measure, measurable functions, Lebesgue integral, convergence theorems, Fubini theorem. differentiability of monotone functions, functions of bounded variation, indefinite integral and itsdifferentiation, absolutely continuous functions, Radon-Nikodym theorem.

Recommended literature:
Základy teorie funkcí a funkcionální analýzy / A. N. Kolmogorov, S. V. Fomin ; přeložili z ruštiny Vladimír Doležal, Zdeněk Tichý. Praha : Státn## nakladatelství technické literatury, 1975
Miera a integrál / Tibor Neubrunn, Beloslav Riečan. Bratislava : Veda, 1981,
Sergei Ovchinnikov: Measure, Integral, Derivative, A course of Lebesgue's theory, Springer 2013.

Languages necessary to complete the course:
Slovak in combination with English (some of the suggested readings can be in English).

Notes:

Past grade distribution Total number of evaluated students: 27					
A	B	C	D	E	FX
40,74	14,81	11,11	7,41	14,81	11,11
Lecturers: doc. RNDr. Eugen Viszus, CSc.					
Last change: 16.06.2022					
Approved by: prof. RNDr. Ján Filo, CSc.					

COURSE DESCRIPTION

Academic year: 2025/2026

University: Comenius University Bratislava

Faculty: Faculty of Mathematics, Physics and Informatics

Course ID:	**Course title:**
FMFI.KMANM/1-MAT-801/15	Topology

Educational activities:
Type of activities: lecture
Number of hours:
per week: 2 **per level/semester:** 26
Form of the course: on-site learning

Number of credits: 3

Recommended semester: 4.

Educational level: I.

Prerequisites: FMFI.KMANM/1-MAT-110/00 - Mathematical Analysis (1)

Recommended prerequisites:
1-MAT-150 Mathematical Analysis (2)

Course requirements:
A student is evaluated on an exam consisting of a written part (100 points) and of an oral part (20 points). Achieving at least 40 points from the written part is a condition for the oral part.
Indicative rating scale: A 90%, B 80%, C 70%, D 60%, E 50%
Scale of assessment (preliminary/final): 0/100

Learning outcomes:
Absolvent will acquire basic knowledge of general topology, which will enable him to study deeper topology, algebraic topology, algebra, mathematical analysis, theory of differential equations and dynamical systems.

Class syllabus:
Topological space, topological subspace, base of topology, criterion for base, construction of topology on a set, properties of open and closed sets, set closure, dense and nowhere dense sets, mappings of topological spaces, continuity of mappings, factor topological spaces, product topology, connected and disconnected topological spaces (sets), continuous image of connected sets, separation axioms, Hausdorff and normal topological spaces, Tietze-Uryson theorem on extension of continuous functions, compact topological spaces (sets), continuous image of compact sets, criteria of compactness of topological spaces, compactification of topological spaces.

Recommended literature:
Basics of general topology /czech/ Jří Adámek, Václav Koubek, Jan Reiterman. Praha : Státní nakladatelství technické literatury, 1977
What is a topology? /slovak/ Milan Hejný, Ivan Kulich, Jozef Tvarožek. Bratislava : Alfa, 1983
Mathematical analysis of real variable functions /slovak/ Marko Švec, Tibor Šalát, Tibor Neubrunn. Bratislava : Alfa, 1987
Metric spaces /slovak/ Tibor Šalát. Bratislava : Alfa,, 1981.
Functional analysis /slovak/ Ladislav Mišík. Bratislava : Alfa, 1989

Languages necessary to complete the course:

Notes:

Past grade distribution
Total number of evaluated students: 42

A	B	C	D	E	FX
52,38	14,29	7,14	14,29	2,38	9,52

Lecturers: prof. RNDr. Milan Medveď, DrSc., RNDr. Michal Pospíšil, PhD.

Last change: 19.03.2025

Approved by: prof. RNDr. Ján Filo, CSc.

COURSE DESCRIPTION

Academic year: 2025/2026

University: Comenius University Bratislava

Faculty: Faculty of Mathematics, Physics and Informatics

Course ID:	**Course title:**
FMFI.KAG/1-MAT-560/00	Web Graphics

Educational activities:
Type of activities: course
Number of hours:
per week: 4 **per level/semester:** 52
Form of the course: on-site learning

Number of credits: 5

Recommended semester: 5.

Educational level: I.

Prerequisites:

Course requirements:
For the semester, the student can get 50% for exercises, 20% for midterm and the final written exam has a weight of 30%. The student must obtain at least half of the points for the exercises as well as for the project in order to pass the final written exam.
Grading: A (100-91), B (90-81), C (80-71), D (70-61), E (60-51), Fx (50-0).
Scale of assessment (preliminary/final): Weight of midterm / final assessment: Mid-term assessment 20% (midterm) / + 50% project 30% final exam.

Learning outcomes:
The course offers knowledge and skills in the dynamically developing field of Internet communication through multimedia objects. Graduates will get acquainted with the rules and methods of effective authoring work and the most modern technologies in accordance with the recommendations of the ACM Computing Curriculum.

Class syllabus:
1. Basic definitions. Historic survey, state-of-the art and the future of WWW. Semantic Web a Digital Libraries. Mobile communication. Security, legal and social aspects. Webby awards.
2. Client-server architecture. Dominant web services and technologies. SGML, HTML, VRML, UML. Java, php, ASP.NET and others. Examples of proper use. MIME formats and RFC standards. WWW Consortium.
3. Text creation, digital typography and DTP. On-line publishing authoring legal aspects.
4. Creation and use of pictorial data for WWW.
5. WWW sound processing and applications.
6. Internet animations and video.
7. WWW virtual interaction. Face demo by Ken Perlin. WWW as a procedural sketch book.
8. Web design styles and rules after A. Glassner.
9. 3D web graphics, VRML a X3D.
10. Virtual galleries, gardens, thematic parks and chat rooms.
11. Social and philosophic aspects of virtual environments. Netiquette. Third wave by A. Toffler. History of virtual reality (Gibson, Krueger, Lanier, CAVE...). Cult movie Matrix and implications of its message.

12. Interakcia, navigácia a kooperácia vo virtuálnych prostrediach. Distribuovaná VR. Hry a simulátory.
13. Spájanie obrazu s textom. Vizuálna kritika web stránok.
14. Virtuálne mestá. Akvizícia, konštrukcia, prezentácia, aplikácie.
15. Groupware. Skupinová komunikácia. Avatari a on-line komunity. MPEG-7 a MPEG-21.

Recommended literature:
CGEMS (web stránka ACM SIGGRAPH, www.siggraph.org).
W3Schools tutorials (HTML, SVG...).
BERNERS-LEE, T. Semantic Web, Scientific American, May 2001.
SIGGRAPH course notes by B. Mitchell, A. Glassner and K. Perlin.
Class materials available from the class web page.

Languages necessary to complete the course:
English, Slovak

Notes:
The class is eventually taught in a distant mode.

Past grade distribution
Total number of evaluated students: 740

A	B	C	D	E	FX
25,54	28,38	21,22	10,54	4,19	10,14

Lecturers: Mgr. Marcel Makovník, PhD., doc. RNDr. Andrej Ferko, PhD.

Last change: 22.06.2022

Approved by: prof. RNDr. Ján Filo, CSc.