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/2-MPG-104/20	Algebraic Geometry (1)

Educational activities:
Type of activities: course
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: II.

Prerequisites:

Course requirements:
Preliminary assessment: homework
Final assessment: oral exam
Grading: A 90%, B 80%, C 70%, D 60%, E 50%

Learning outcomes:
The student gains an overview of the basic concepts of algebraic geometry as well as the most common computational methods there.

Class syllabus:
- ideals and varieties in affine space, Hilbert's basis theorem
- Nullstellensatz
- elements of algebraic geometry:
- Zariski topology,
- coordinate rings, morphisms and rational maps
- computational methods of algebraic geometry: Gröbner bases, resultants
- Sturm sequences (calculations in real algebraic geometry)

Recommended literature:

Languages necessary to complete the course:

Notes:

Past grade distribution
Total number of evaluated students: 19

A	B	C	D	E	FX
78,95	0,0	5,26	15,79	0,0	0,0

Lecturers: RNDr. Jana Chalmovianská, 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.KAG/2-MAT-610/09	Algebraic 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: 4.

Educational level: II.

Prerequisites:

Recommended prerequisites:
2-MAT-213 Selected topics in algebra (1) AND 2-MAT-215 Field Theory (1)

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

Learning outcomes:
Mastering basic concepts and methods from algebraic number theory. Awareness of the importance of uniqueness of prime decomposition in integral domains, Ability to solve some types of Diophantine equations.

Class syllabus:
Algebraic numbers and algebraic integers. Quadratic and cyclotomic fields. Prime decomposition. Ramanujan-Nagel theorem. Ideals, norms, prime decomposition of ideals. Integral lattices. Minkowski theorem.

Recommended literature:
Algebraic Number Theory and Fermat's Last Theorem/ Ian Stewart, David Tall. A. K. Peters 2001

Languages necessary to complete the course:
slovak, english

Notes:

Past grade distribution
Total number of evaluated students: 20

A	B	C	D	E	FX
75,0	5,0	15,0	5,0	0,0	0,0

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/2-MAT-223/09	Algebraic Topology

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

Number of credits: 6

Recommended semester: 2.

Educational level: II., III.

Prerequisites:

Course requirements:
Exam: written and oral
Indicative assessment scale: A 90%, B 80%, C 70%, D 60%, E 50%

Learning outcomes:
Subject aim: to acquaint students with basic ideas, methods and some applications of algebraic topology.

Class syllabus:
The problem of homeomorphy. Constructions of new topological spaces by forming quotient spaces. Attaching a cell to a topological space. Surfaces and topological manifolds. Path-connectedness. Homotopy. Fundamental group. Basic homology theory. Homology groups of spheres and their applications. Cohomology groups, cohomology ring, and applications.

Recommended literature:
A. Hatcher, Algebraic Topology. Cambridge University Press 2002
A. Kriegl, Algebraic Topology. Lecture Notes. University of Vienna, Vienna 2008, accessible at http://www.mat.univie.ac.at/~kriegl/Skripten/alg-top.pdf
W. Massey, A Basic Course in Algebraic Topology. Springer-Verlag, New York 1991
E. Spanier, Algebraic Topology. Springer-Verlag, New York 1995

Languages necessary to complete the course:
English

Notes:

Past grade distribution
Total number of evaluated students: 51

A	ABS	B	C	D	E	FX	NEABS
62,75	0,0	19,61	7,84	5,88	3,92	0,0	0,0

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/2-MAT-226/14	Applications of set 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: 2.

Educational level: II.

Prerequisites:

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

Learning outcomes:
Students will be able to apply more advanced set-theoretic techniques (mainly Zorn's lemma and transfinite induction) to problems from various areas of mathematics.

Class syllabus:
Axiom of choice and its equivalents. Zorn lemma and its applications. Ordinals, transfinite induction and its applications. Almost disjoints systems, infinite trees, ultrafilters.

Recommended literature:
Combinatorial set theory : With a gentle introduction to forcing / Lorenz J. Halbeisen. London : Springer, 2012

Languages necessary to complete the course:

Notes:

Past grade distribution
Total number of evaluated students: 13

A	B	C	D	E	FX
92,31	0,0	0,0	0,0	0,0	7,69

Lecturers: RNDr. Martin Sleziak, 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.KAI/2-MXX-133/23	Artificial Intelligence for Everyone

Educational activities:
Type of activities: training session / course
Number of hours:
per week: 9 **per level/semester:** 1t / 117
Form of the course: on-site learning

Number of credits: 6

Recommended semester:

Educational level: 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: 22

A	B	C	D	E	FX
45,45	36,36	4,55	9,09	4,55	0,0

Lecturers: prof. Ing. Igor Farkaš, Dr.

Last change:

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/2-MAT-123/15	Calculus of Variations

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: 2.

Educational level: II., III.

Prerequisites:

Course requirements:
Preliminary grading: homeworks.
Exam: written and oral.
Grading: A 90%, B 80%, C 70%, D 60%, E 50%.
Scale of assessment (preliminary/final): 20/80

Learning outcomes:
The students will learn to differentiate variational integrals and related Nemytskii mappings, they will be able to verify necessary and sufficient conditions guaranteeing the existence of global and local extrema of particular functionals, to find extrema in the case of one-dimensional integrals and find out, whether these extrema are weak or strong.

Class syllabus:
Differentiability of the Nemytskii mapping, basic existence theorem for global extrema, necessary and sufficient conditions for local extrema,
constrained extrema, the Euler and Jacobi equations, necessary and sufficient conditions for strong and weak extrema of one-dimensional integrals, investigation of critical points of particular functionals.

Recommended literature:
B. Dacorogna: Direct methods in the calculus of variations, Springer, Berlin - Heidelberg 2008.
M. Struwe: Variational methods, Springer, Berlin - Heidelberg 2008.
J.L. Troutman: Variational calculus and Optimal Control, Springer, New York 1996.
G. Buttazzo, M. Giaquinta, S. Hildebrandt: One-dimensional variational problems, Clarendon Press, Oxford 1998.

Languages necessary to complete the course:
English

Notes:

Past grade distribution
Total number of evaluated students: 12

A	ABS	B	C	D	E	FX	NEABS
50,0	0,0	25,0	0,0	8,33	0,0	16,67	0,0

Lecturers: prof. RNDr. Pavol Quittner, 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.KAG/2-MAT-617/09	Category Theory (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: 3.

Educational level: II., III.

Prerequisites:

Course requirements:
Continuous assessment: homework and 1 presentation
Indicative evaluation scale: A 90%, B 80%, C 70%, D 60%, E 50%
Scale of assessment (preliminary/final): 100/0

Learning outcomes:
Students will master selected basic concepts and methods of category theory and will be able to apply them in topology and algebra.

Class syllabus:
Categories, functors and natural transformations. Special morphisms and objects. Subcategories. Limits and colimits. Factorization systems.

Recommended literature:
Algebra a príbuzné disciplíny / Milan Kolibiar ...[et al.]. Bratislava : Alfa, 1992
Categories for the working mathematician / Saunders Mac Lane. New York : Springer, 1997
Abstract and Concrete Categories/Jiří Adámek, Horst Herrlich, George E. Strecker. http://katmat.math.uni-bremen.de/acc/acc.pdf

Languages necessary to complete the course:
Slovak, English

Notes:

Past grade distribution
Total number of evaluated students: 30

A	ABS	B	C	D	E	FX	NEABS
96,67	0,0	0,0	0,0	0,0	0,0	3,33	0,0

Lecturers: doc. Mgr. Tibor Macko, PhD., Mgr. Tomáš Rusin, 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/2-MAT-622/09	Category Theory (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: 4.

Educational level: II., III.

Prerequisites:

Course requirements:
Continuous assessment: homework and 1 presentation
Indicative evaluation scale: A 90%, B 80%, C 70%, D 60%, E 50%
Scale of assessment (preliminary/final): 100/0

Learning outcomes:
Students will master selected basic concepts and methods of category theory and will be able to apply them in topology and algebra.

Class syllabus:
Adjoint functors, existence theorems, reflective and coreflective subcategories. Generators and cogenerators of categories and subcategories. Application of category theory methods in topology and algebra.

Recommended literature:
Algebra a príbuzné disciplíny / Milan Kolibiar ...[et al.]. Bratislava : Alfa, 1992
Categories for the working mathematician / Saunders Mac Lane. New York : Springer, 1997
Abstract and Concrete Categories/Jiří Adámek, Horst Herrlich, George E. Strecker. http://katmat.math.uni-bremen.de/acc/acc.pdf

Languages necessary to complete the course:
Slovak, English

Notes:

Past grade distribution
Total number of evaluated students: 14

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

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.KAMŠ/2-PMS-116/19	Cluster analysis and data classification

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: II.

Prerequisites:

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

Learning outcomes:
The students understand the principles and practical realization of selected methods of cluster analysis and statistical data classification.

Class syllabus:
Selected multivariate data visualization methods, partitional clustering (k-means, k-medoids, DBSCAN, OPTICS, clustering based on the mixture of Gaussian distributions, spectral clustering), hierarchical clustering, general introduction to the statistical classification methods, Bayes classifier, k nearest neighbors, linear and quadratic discrimination, classification trees and forests, bagging and boosting, support vector machines, multinomial regression as a classification method

Recommended literature:
Izenman A: Modern Multivariate Statistical Techniques: Regression, Classification, and Manifold Learning (Springer Texts in Statistics) 1st ed., 2nd printing 2013; James G, Witten D, Hastie T, Tibshirani R: An Introduction to Statistical Learning: with Applications in R (Springer Texts in Statistics) 2nd ed., Springer 2021; Harman R: Multivariate Statistical Analysis (Selected Lecture Notes), study materials of the lecturer, 2021.

Languages necessary to complete the course:
Slovak, English

Notes:
The knowledge of the software R is recommended. Enrollment limit: 40 students

Past grade distribution Total number of evaluated students: 173					
A	B	C	D	E	FX
59,54	23,7	9,25	1,16	1,73	4,62
Lecturers: doc. Mgr. Radoslav Harman, PhD., Mgr. Samuel Rosa, PhD.					
Last change: 10.03.2022					
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/2-MAT-232/09	Computer Algebra (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: 3.

Educational level: II.

Prerequisites:

Recommended prerequisites:
1-INF-156 Algebra (2) OR 1-MAT-260 Algebra (2)

Course requirements:
oral exam with presentation
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 algorithms of computer algebra, know most of the details of their implementation and time complexity.

Class syllabus:
Basic algorithms for numbers and polynomials and their complexity. Methods of calculations using homomorphic images, Chinese residue theorem for Euclidean rings. Discrete Fourier and inverse Fourier transform, use in fast multiplication of polynomials and large integers. Berlekamp's algorithm for polynomial factorization over finite fields. Polynomial factorization withinin the ring Z[x] and within the rings of polynomials over finite algebraic extensions of the field Q.

Recommended literature:
The Art of computer programming : Volume 2. Seminumerical Algorithms / Donald E. Knuth. Reading : Addison-Wesley, 1969
Lecturer's electronic texts, manuscripts.

Languages necessary to complete the course:
slovak, english

Notes:

Past grade distribution
Total number of evaluated students: 50

A	B	C	D	E	FX
88,0	8,0	2,0	0,0	2,0	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/2-MAT-241/09	Computer Algebra (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: 4.

Educational level: II.

Prerequisites:

Recommended prerequisites:
1-INF-156 Algebra (2) OR 1-MAT-260 Algebra (2)

Course requirements:
oral exam with presentation
A - 91%+
B - 81%-90%
C - 71%-80%
D - 61%-70%
E - 50%-60%
Fx - less than 50%

Learning outcomes:
Students will know the advantages and disadvantages of the data structures used. They will master in detail the theoretical significance of Groebner bases and also the details of the algorithm for finding GB's for a given ideal and other related algorithms. They will also be able to use Groebner bases to solve some important problems in rings of multivariate polynomials.

Class syllabus:
Data representation and data structures. The problem of simplification and growth of intermediate results. Groebner basis of the ideal of a ring of real polynomials of several variables, applications to solutions of finite systems of polynomial equations of several variables and automatic proof of theorems of classical geometry. Well-founded and Dickson's quasiorderings and their role in computer algebra.

Recommended literature:
Gröbner Bases : A computational approach to commutative Algebra / Thomas Becker, Volker Weispfenning, Heinz Kredel. New York : Springer, 1993
Lecturer's electronic texts, manuscripts.

Languages necessary to complete the course:
slovak, english

Notes:

Past grade distribution
Total number of evaluated students: 54

A	B	C	D	E	FX
85,19	5,56	7,41	0,0	1,85	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.KAMŠ/2-EFM-117/12	Convex Optimisation

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: 2.

Educational level: II.

Prerequisites:

Recommended prerequisites:
Nonlinear programming, Linear programming

Course requirements:
Ongoing assessment: homework assignments (20%), in-class tests (30%)
Final assessment: semester project (20%), final exam (30%)
Grading A 91%, B 81%, C 71%, D 61%, E 51%
Scale of assessment (preliminary/final): 50% /50%

Learning outcomes:
Student learn the basic theory of convex analysis and convex (conic) optimization,
basic classes of convex conic programming, and methods for solving them, they learn the duality theory of conic linear programming. They are able to use Matlab and CVX (cvxopt) modeling system for solving convex problems, they are able to solve various practical problems and applications.

Class syllabus:
Convex optimization problems in standard form
Generalization of standard convex problems
Conic convex problems (SDP, SOCP,..)
Geometry of convex cones
Duality theory for conic linear programs
Applications of convex conic problems
Conic relaxations
Interior point methods

Recommended literature:
M. Trnovská: Konvexná optimalizácia, elektronický text.
Boyd, Vandenberghe: Convex Optimization, Cambridge Univ.Press 2004
CVX: Matlab Software for Disciplined Convex Programming www.stanford.edu/~boyd/cvxbook
Ben-Tal, Nemirovski: Lectures on Modern Convex Optimization, SIAM 2001

Languages necessary to complete the course:
Slovak, English

Notes:

Past grade distribution
Total number of evaluated students: 140

A	B	C	D	E	FX
68,57	15,0	9,29	2,14	2,86	2,14

Lecturers: doc. RNDr. Mária Trnovská, PhD., Mgr. Jakub Hrdina, 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.KI/2-INF-178/15	Cryptology (1)

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

Number of credits: 6

Recommended semester: 3.

Educational level: I., II.

Prerequisites:

Course requirements:
Homework assignments,
Condition for qualifying for the exam: timely and correctly solved all homework assignments,
Exam: written exam,
Approximate grading scale: A 92%, B 84%, C 76%, D 68%, E 60%
Scale of assessment (preliminary/final): 20/80

Learning outcomes:
The students will have the knowledge of basic cryptographic constructions; they will understand security guarantees provided by these constructions, and assumptions required for their security. The students will be able to choose a suitable cryptographic construction for given application / information system.

Class syllabus:
symmetric ciphers (block and stream ciphers), asymmetric ciphers, underlying problems for asymmetric constructions, hash functions, message authentication codes, digital signatures, passwords, secret sharing schemes, cryptographic protocols and related attacks, zero-knowledge proofs

Recommended literature:
Douglas R. Stinson, Maura Paterson: Cryptography: Theory and Practice, Chapman and Hall/ CRC; 4th edition, 2018
Nigel P. Smart: Cryptography Made Simple, Springer, 2016
Jean-Philippe Aumasson: Serious Cryptography: A Practical Introduction to Modern Encryption, 2017
Other on-line resources

Languages necessary to complete the course:
Slovak, English

Notes:

Past grade distribution
Total number of evaluated students: 131

A	B	C	D	E	FX
10,69	10,69	16,03	16,03	26,72	19,85

Lecturers: doc. RNDr. Martin Stanek, PhD.

Last change: 28.06.2022

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/2-MPG-108/22	Differential Geometry

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

Number of credits: 4

Recommended semester: 1.

Educational level: II.

Prerequisites:

Course requirements:
Homeworks (written solutions of problems and their consulting 20%), final exam (oral exam with written preparation 80%). Rough evaluation scale: A 90%, B 80%, C 70%, D 60%, E 50%
Scale of assessment (preliminary/final): 20/80

Learning outcomes:
By completing this subject, the students will deepen the knowledge of curves in Euclidean plane and Euclidean 3-space, as well as the knowledge of surfaces, needed in advanced computer graphics, geometric modeling and their applications.

Class syllabus:
Curves: Torsion of a curve, the Frenet formulas. Envelopes of a one-parameter family of curves. Singular points of plane curves. The oriented curvature of plane curves. Some special curves (evolutes, evolvents, equidistants).
Surfaces: Developable ruled surfaces. The first fundamental form of a surface and measuring on a surface. Mappings of surfaces. The Dupin indicatrix, directions at a point. Principal directions and principal curvatures. The Gaussian curvature. Geodesics. Semi-geodesic coordinates. Extremal properties of geodesics. Surfaces of constant Gaussian curvature.

Recommended literature:
Analytická a diferenciální geometrie / Bruno Budinský. Praha : Státní nakladatelství technické literatury, 1983
Lectures on classical differential geometry / Dirk J. Struik. Cambridge : Addison-Wesley Press, 1950
Electronic texts by the teacher, published on the WWW page of the subject.

Languages necessary to complete the course:
Slovak and English

Notes:

Past grade distribution
Total number of evaluated students: 10

A	B	C	D	E	FX
60,0	0,0	10,0	10,0	10,0	10,0

Lecturers: 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/2-MAT-214/09	Differential 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: 4

Recommended semester: 1.

Educational level: II., III.

Prerequisites:

Course requirements:
Exam: written and oral
Indicative assessment scale: A 90%, B 80%, C 70%, D 60%, E 50%

Learning outcomes:
Subject aim: to acquaint students with basic ideas, methods and some applications of differential topology.

Class syllabus:
A review of selected basic notions of general topology. Differentiable manifolds and differentiable maps. Tangent vector space. The differential of a differentiable map at a point. Tangent bundles. Submanifolds. Immersions and embeddings of manifolds. Inverse Function Theorem and its corollaries; transversality. Regular and critical points, regular and critical values, Sard's Theorem. Proof of the fundamental theorem of algebra.

Recommended literature:
M. Hirsch, Differential Topology. Springer-Verlag, New York 1976.
J. Milnor, Topology from the Differential Viewpoint, The Univ. Press of Virginia, Charlottesville 1965.
I. Singer, J. Thorpe, Lecture Notes on Elementary Topology and Geometry, Scott, Foresman and Co., Glenview, Illinois 1967.
F. Warner, Foundations of Differentiable Manifolds and Lie Groups. Springer-Verlag, Berlin 1983.

Languages necessary to complete the course:
English

Notes:

Past grade distribution
Total number of evaluated students: 52

A	ABS	B	C	D	E	FX	NEABS
65,38	1,92	7,69	15,38	1,92	3,85	3,85	0,0

Lecturers: doc. Mgr. Tibor Macko, PhD.

Last change: 21.06.2022

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/2-MAT-991/22	**Course title:** Diploma Thesis Defense
Number of credits: 12	
Educational level: II.	
Learning outcomes: The result of successful completion of the state exam will be the defense of the thesis.	
Class syllabus: Defense of the diploma thesis in the form of a presentation in front of the commission and answering the opponent's comments.	
State exam syllabus:	
Recommended literature: Ako písať vysokoškolské a kvalifikačné práce : Ako písať seminárne práce, ročníkové práce, práce študentskej vedeckej a odbornej činnosti, diplomové práce, záverečné a atestačné práce, dizertácie / Dušan Katuščák. Bratislava : Stimul, 1998	
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/2-MAT-920/22	Diploma Thesis Seminar

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: 3

Recommended semester: 4.

Educational level: II.

Prerequisites:

Course requirements:
Mid-term evaluation: compulsory participation in presentations of your classmates (20%) and two presentation of your obtained results (80%).
Indicative assessment scale: A 90%, B 80%, C 70%, D 60%, E 50%
Scale of assessment (preliminary/final): 100/0

Learning outcomes:
Students will gain skills of formal writing of scientific text and modern methods of presentation of their own results.

Class syllabus:
Each student will present (twice a semester) partial results of his/her diploma thesis.

Recommended literature:
Ako písať vysokoškolské a kvalifikačné práce : Ako písať seminárne práce, ročníkové práce, práce študentskej vedeckej a odbornej činnosti, diplomové práce, záverečné a atestačné práce, dizertácie / Dušan Katuščák. Bratislava : Stimul, 1998

Languages necessary to complete the course:
Slovak. English

Notes:

Past grade distribution
Total number of evaluated students: 31

A	B	C	D	E	FX
90,32	3,23	0,0	0,0	3,23	3,23

Lecturers: prof. RNDr. Ján Filo, CSc., 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/2-MAT-111/15	Dynamical Systems

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: II.

Prerequisites:

Recommended prerequisites:
(1-MAT-801 Topology or 1-MAT-150 Mathematical Analysis (2)) and 1-MAT-310 Ordinary Differential Equations (1)

Course requirements:
Continuous assessment: 20 points for exercises
Final examination: written exam for 60 points and oral exam for 20 points
Indicative assessment scale: A 90%, B 80%, C 70%, D 60%, E 50%
Scale of assessment (preliminary/final): 20/80

Learning outcomes:
The graduate will acquire basic knowledge of the theory of dynamical systems, which will enable him to continue his education in this theory, for example in postgraduate studies, and will also gain the ability to apply this theory in solving problems in the field of natural and technical sciences.

Class syllabus:
Mathematical pendulum, gradient and Hamiltonian system, autonomous differential equations, phase portrait, local and global flow, continuous and discrete dynamical system (DS), invariant sets, asymptotic properties of DS, normal forms of DS, orbital equivalence, Hartmann's theorem, invariant manifolds, reduction to the central manifold, bifurcation, bifurcation equation. Basic bifurcations (Hopf, saddle-node type, period doubling type, Neimark-Sacker bifurcation, bifurcations around periodic trajectories).

Recommended literature:
Medveď, M. : Dynamické systémy, Bratislava, Univerzita Komenského, 2000.
Medveď, M. : Fundamentals of dynamical systems and bifurcation theory, 1992.

Languages necessary to complete the course:

Notes:

Past grade distribution
Total number of evaluated students: 24

A	B	C	D	E	FX
45,83	8,33	20,83	16,67	0,0	8,33

Lecturers: RNDr. Michal Pospíšil, PhD., prof. RNDr. Milan Medveď, DrSc., RNDr. František Jaroš, PhD., prof. RNDr. Michal Fečkan, DrSc.

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.KAI/2-MXX-130/21	Elements of AI

Educational activities:
Type of activities: independent work
Number of hours:
per week: 25 **per level/semester:** 325
Form of the course: on-site learning

Number of credits: 2

Recommended semester: 2., 8.

Educational level: II.

Prerequisites:

Course requirements:
Passing the online course https://course.elementsofai.com/ (in Enlish or Slovak version).

Learning outcomes:
The student will get acquainted with selected basic concepts of artificial intelligence and their use in solving various practical tasks.

Class syllabus:
1. What is artificial intelligence: related areas, AI philosophy.
2. Troubleshooting and UI: Browsing and troubleshooting, browsing and games
3. Probability and chance, Bayes' theorem, naive Bayesian classification.
4. Machine learning: nearest neighbor classifier, regression.
5. Neural networks: basics, creation, modern techniques.
6. Consequences: on predicting the future, the effects of AI on society, summary.

Recommended literature:
Russell S., Norwig P. (2010). Artificial Intelligence: A Modern Approach, (3rd ed.), Prentice Hall. Available in faculty library.
Marsland S. (2015). Machine Learning: An Algorithmic Perspective, (2nd ed.), CRC Press.

Languages necessary to complete the course:
Slovak or English

Notes:
The course consists of 20 numerical and 5 text-based tasks. Numerical tasks are checked automatically, text-based tasks are evaluated anonymously by students.

Past grade distribution
Total number of evaluated students: 95

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

Lecturers: doc. RNDr. Mária Markošová, PhD.

Last change: 22.08.2021
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-MXX-130/21	Elements of AI

Educational activities:
Type of activities: independent work
Number of hours:
per week: 25 **per level/semester:** 325
Form of the course: on-site learning

Number of credits: 2

Recommended semester: 1., 7.

Educational level: II.

Prerequisites:

Course requirements:
Passing the online course https://course.elementsofai.com/ (in Enlish or Slovak version).

Learning outcomes:
The student will get acquainted with selected basic concepts of artificial intelligence and their use in solving various practical tasks.

Class syllabus:
1. What is artificial intelligence: related areas, AI philosophy.
2. Troubleshooting and UI: Browsing and troubleshooting, browsing and games
3. Probability and chance, Bayes' theorem, naive Bayesian classification.
4. Machine learning: nearest neighbor classifier, regression.
5. Neural networks: basics, creation, modern techniques.
6. Consequences: on predicting the future, the effects of AI on society, summary.

Recommended literature:
Russell S., Norwig P. (2010). Artificial Intelligence: A Modern Approach, (3rd ed.), Prentice Hall. Available in faculty library.
Marsland S. (2015). Machine Learning: An Algorithmic Perspective, (2nd ed.), CRC Press.

Languages necessary to complete the course:
Slovak or English

Notes:
The course consists of 20 numerical and 5 text-based tasks. Numerical tasks are checked automatically, text-based tasks are evaluated anonymously by students.

Past grade distribution
Total number of evaluated students: 95

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

Lecturers: doc. RNDr. Mária Markošová, PhD.

Last change: 22.08.2021
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.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: 1., 3., 7., 9.

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: 2., 4., 8., 10.

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.KAG/2-MAT-215/12	Field Theory (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: 1.

Educational level: II.

Prerequisites:

Recommended prerequisites:
1-MAT-220 Algebra (1) OR 1-INF-156 Algebra (2)

Course requirements:
Exam: oral
Indicative evaluation scale: A 90%, B 80%, C 70%, D 60%, E 50%
Scale of assessment (preliminary/final): 10/90

Learning outcomes:
Mastering basic concepts and methods in the field of field theory. Studying the basic theorem of Galois theory for finite extensions and its consequences.

Class syllabus:
Field extensions. Finite fields. Introduction to the Galois theory. Fundamental theorem of algebra. Radical extensions

Recommended literature:
Birkhoff, G., MacLane, S: Prehľad modernej algebry
Lang, S.: Algebra
Niederreiter, H., Lidl, R.: Theory of fields

Languages necessary to complete the course:

Notes:

Past grade distribution
Total number of evaluated students: 37

A	B	C	D	E	FX
64,86	10,81	8,11	2,7	8,11	5,41

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/2-MAT-216/12	Field Theory (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: 2.

Educational level: II.

Prerequisites:

Recommended prerequisites:
2-MAT-215 Field theory (1)

Course requirements:
Exam: oral
Indicative evaluation scale: A 90%, B 80%, C 70%, D 60%, E 50%
Scale of assessment (preliminary/final): 10/90

Learning outcomes:
Mastery of basic concepts and methods in the field of field theory applications and the ability to actively use them to solve practical problems.

Class syllabus:
Generation of finite fields. Rabin-Miller and Agrawal-Kayena-Saxena test for primality. Applications in cryptography: RSA and XTR. Wedderburn's theorem.

Recommended literature:
Prime Numbers: A Computational Perspective. Richard Crandall, Carl Pomerance. Springer 2010

Languages necessary to complete the course:

Notes:

Past grade distribution
Total number of evaluated students: 35

A	B	C	D	E	FX
82,86	11,43	5,71	0,0	0,0	0,0

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.KAMŠ/1-EFM-370/00	Financial Mathematics

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., II.

Prerequisites: FMFI.KAMŠ/1-EFM-250/00 - Mathematical Analysis (4) or FMFI.KAMŠ/1-DAV-102/20 - Calculus (1) or FMFI.KMANM/1-MAT-250/22 - Mathematical Analysis (4) or FMFI.KMANM/1-MAT-250/14 - Mathematical Analysis (4)

Course requirements:
Evaluation during the semester: Project, written test, activity during exercises
Written exam. Voluntary oral examination to improve the final evaluation.
Informative evaluation 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 the basic principles of interest rate theory and bond investment management. They will also get acquainted with the principles of stock portfolio management. In the last part of the lecture, they will learn to price derivatives of the European and American type using binomial trees and will also get acquainted with Black-Scholes formulas for pricing put and call options.

Class syllabus:
Coupon and zero-coupon bonds, term structure of interest rates, bootstrap method, yield to maturity, forward rates, duration.
Risk aversion, properties of utility functions, utility functions and mean-variance analysis, the problem of Markowitz, Capital Asset Pricing Model (CAMP).
Binomial tree model, risk-neutral probabilities, risk-neutral pricing formula, Black-Scholes formula, pricing of american options.

Recommended literature:
Baxter M., Rennie A.: Financial Calculus
Hull J.: Options, Futures and Other Derivatives
Luenberger D.: Investment Science

Languages necessary to complete the course:
English, Slovak

Notes:

Past grade distribution Total number of evaluated students: 712					
A	B	C	D	E	FX
58,71	21,07	10,81	6,04	2,67	0,7
Lecturers: doc. Mgr. Igor Melicherčík, PhD., Mgr. Alex Babiš					
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/2-MAT-315/19	Finite Difference Methods for Differential Equations

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: II.

Prerequisites:

Antirequisites: FMFI.KMANM/2-EFM-101/15

Course requirements:
Preliminary assessment: 2 written tests 10 points each, project 20 points
Final examination: written exam for 50 points and oral exam for 10 points
Grading scheme: A 90%, B 80%, C 70%, D 60%, E 50%
Scale of assessment (preliminary/final): 40/60

Learning outcomes:
Student will be able to solve ordinary and partial differential equations by modern numerical methods.

Class syllabus:
Numerical methods for ordinary differential equations.
Initial value problem, one-step and multistep methods of Runge-Kutta type.
Methods for Solving Ordinary Differential Equations.
Applications of ODR numerical methods in physics and biology.
Numerical solution of boundary value problems for ordinary differential equations, difference method, shooting method.
Partial differential equation: Finite difference method for parabolic, hyperbolic and elliptic problems in 2D, explicit and implicit methods, stability, alternating direction method.
Applications of PDR numerical methods in physics and biology.
Implementation of numerical algorithms in Matlab and Python.

Recommended literature:
E. Vitásek: Numerická matematika II : Numerické řešení diferenciálních rovnic, Praha : Univerzita Karlova, 1981
E. Vitásek: Numerické metody, Praha : Státní nakladatelství technické literatury, 1987
G. H. Golub, J. M. Ortega: Scientific Computing and Differential Equations: An Introduction to Numerical Methods, Academic Press, 1992
M. H. Holmes: An Introduction to Numerical Methods in Differential Equations, Springer, 2007

Languages necessary to complete the course:
Slovak, English

Notes:

Past grade distribution
Total number of evaluated students: 33

A	B	C	D	E	FX
48,48	12,12	15,15	15,15	9,09	0,0

Lecturers: Mgr. Jela Babušíková, PhD., prof. RNDr. Ján Filo, CSc., 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.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., 7.

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., 8.

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., 9.

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., 10.

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.KAMŠ/2-MAT-115/12	Functional Analysis

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: II.

Prerequisites:

Course requirements:
Preliminary grading: homeworks.
Exam: written and oral.
Grading: A 90%, B 80%, C 70%, D 60%, E 50%.
Scale of assessment (preliminary/final): 20/80

Learning outcomes:
The students will learn to determine the spectrum of certain types of linear operators, the convergence of operators and functions in various topologies and function spaces, and perform basic operations with distributions.

Class syllabus:
Compact operators and Fredholm's alternative, spectrum of closed, continuous, compact and self-adjoint operators, locally convex spaces and continuous linear operators in these spaces, weak topologies and compactness in weak topologies, distributions.

Recommended literature:
W. Rudin: Functional Analysis, McGraw-Hill, New York 1973.
K. Yosida: Functional Analysis, Springer, Berlin, Heidelberg 1980.
A.E. Taylor: Introduction to Functional Analysis, John Wiley & Sons, New York 1958.
A.W. Naylor & G.R. Sell: Linear operator theory in engineering and science, Holt, Rinehart & Winston, New York, 1971.

Languages necessary to complete the course:
English

Notes:

Past grade distribution
Total number of evaluated students: 30

A	B	C	D	E	FX
56,67	16,67	20,0	3,33	3,33	0,0

Lecturers: prof. RNDr. Pavol Quittner, 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.KAG/2-MAT-211/15	General Topology

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

Number of credits: 5

Recommended semester: 1.

Educational level: II., III.

Prerequisites:

Course requirements:
Final evaluation: oral exam
Rating scale: A 90%, B 80%, C 70%, D 60%, E 50%
Scale of assessment (preliminary/final): 100% final exam

Learning outcomes:
Students will understand basic notions of general topology, properties of topological spaces and their subsets, basic topological constructions. They will be able to apply topological results in further areas of mathematical analysis, topology and geometry.

Class syllabus:
Topological spaces and continuous functions. Basic topological constructions (subspace, topological sum and product, quotient space).
Countability axioms and separation axioms (Hausdorff, regular, completely regular and normal spaces). Connected and linearly connected spaces. Compact and locally compact spaces. Metric space, metrizable spaces.

Recommended literature:
General topology / Stephen Willard. Mineola : Dover, 1970
Topology / James R. Munkres. Upper Saddle River : Prentice-Hall , 2000

Languages necessary to complete the course:
Slovak, English

Notes:

Past grade distribution
Total number of evaluated students: 22

A	ABS	B	C	D	E	FX	NEABS
77,27	0,0	18,18	0,0	0,0	0,0	4,55	0,0

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.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., 7.

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., 8.

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., 9.

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., 10.

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/2-MAT-225/15	Group Theory Applications in Discrete Mathematics

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: 2.

Educational level: II.

Prerequisites:

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 be familiar with the basic theory of permutation groups and will be able to use and apply the acquired information in determining the automorphism groups of various types of combinatorial structures. They will be able to construct structures with a prescribed automorphism group and symmetry level.

Class syllabus:
Introduction to permutation group theory, group actions, transitive actions, primitive actions, point stabilizers, recursive constructions of groups, automorphism groups of combinatorial structures, vertex-, edge-, and arc-transitive graphs, automorphism groups of finite geometries, Cayley graphs, graphs with a prescribed abstract automorphism group, graphs with a prescribed permutation group for their automorphism group, the effect of recursive constructions on the automorphism groups of the resulting graphs.

Recommended literature:
Algebraic graph theory / Norman Biggs. Cambridge : Cambridge University Press, 1993
Discrete mathematics / Norman L. Biggs. Oxford : Clarendon Press, 1985
An Introduction to the theory of groups / Joseph J. Rotman. New York : Springer, 1995
Electronic texts prepared by the teacher made available at the course web page.
Selection of recenty articles published in the area.

Languages necessary to complete the course:
Slovak, English

Notes:

Past grade distribution
Total number of evaluated students: 22

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

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.KMANM+KAMŠ/2-MAT-314/15	Handling of Modern Software in Numerical Mathematics

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.

Educational level: II.

Prerequisites:

Course requirements:
Continuous assessment: active work on lectures 30 points, 2x individual work 20 points each, project 30 points
Final evaluation: 100 - 90 A, 89 - 80 B, 79 - 70 C, 69 - 60 D, 59 - 50 E, less than 50 FX.

Learning outcomes:
Handling the procedures of practical solution of differential equations.

Class syllabus:
Solving one-dimensional differential equations of elliptical and parabolic type using MATLAB software, handling the numerical package PLTMG - defining own problems and modification to solve parabolic type problems.

Recommended literature:
R. E. Bank: A Software Package for Solving Elliptic Partial Differential Equations, Users' Guide 9.0, University of California at San Diego
G. H. Golub, J. M. Ortega: Scientific Computing and Differential Equations: An Introduction to Numerical Methods, Academic Press, 1992

Languages necessary to complete the course:
Slovak, English

Notes:

Past grade distribution
Total number of evaluated students: 20

A	B	C	D	E	FX
90,0	10,0	0,0	0,0	0,0	0,0

Lecturers: doc. RNDr. Peter Guba, PhD., Mgr. Jela Babušíková, 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/2-MAT-910/22	Individual Work on Final Thesis (1)

Educational activities:
Type of activities: independent work
Number of hours:
per week: **per level/semester:** 100s
Form of the course: on-site learning

Number of credits: 5

Recommended semester: 2.

Educational level: II.

Prerequisites:

Course requirements:
Continuous assessment: individual work under the supervision of the thesis supervisor, evaluation based on the recommendation of the thesis supervisor
Indicative assessment scale: A 90%, B 80%, C 70%, D 60%, E 50%
Scale of assessment (preliminary/final): 100/0

Learning outcomes:
The student will gain an overview of the available literature in the field of the assigned topic of his thesis and will prepare its introductory part.
Together with the thesis supervisor, they will specify the goals for the next stage of the thesis.

Class syllabus:
A typical diploma thesis usually contains: title page with title, content, introduction, historical overview of the issue, theory, main results, conclusion, list of used literature, or appendices and appendices.

Recommended literature:
Ako písať vysokoškolské a kvalifikačné práce : Ako písať seminárne práce, ročníkové práce, práce študentskej vedeckej a odbornej činnosti, diplomové práce, záverečné a atestačné práce, dizertácie / Dušan Katuščák. Bratislava : Stimul, 1998

Languages necessary to complete the course:
Slovak, English

Notes:

Past grade distribution
Total number of evaluated students: 36

A	B	C	D	E	FX
88,89	2,78	0,0	2,78	5,56	0,0

Lecturers: prof. RNDr. Ján Filo, CSc.

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.KMANM/2-MAT-911/22	Individual Work on Final Thesis (2)

Educational activities:
Type of activities: independent work
Number of hours:
per week: **per level/semester:** 100s
Form of the course: on-site learning

Number of credits: 5

Recommended semester: 3.

Educational level: II.

Prerequisites:

Course requirements:
Continuous assessment: individual work under the supervision of the thesis supervisor, evaluation based on the recommendation of the thesis supervisor
Indicative assessment scale: A 90%, B 80%, C 70%, D 60%, E 50%
Scale of assessment (preliminary/final): 100/0

Learning outcomes:
The student will work out the basis of his / her diploma thesis and together with the supervisor of his / her diploma thesis he / she will specify the goals for the last stage of the work on the final thesis.

Class syllabus:
A typical diploma thesis usually contains: title page with title, content, introduction, historical overview of the issue, theory, main results, conclusion, list of used literature, or appendices and appendices.

Recommended literature:
Ako písať vysokoškolské a kvalifikačné práce : Ako písať seminárne práce, ročníkové práce, práce študentskej vedeckej a odbornej činnosti, diplomové práce, záverečné a atestačné práce, dizertácie / Dušan Katuščák. Bratislava : Stimul, 1998

Languages necessary to complete the course:
Slovak, English

Notes:

Past grade distribution
Total number of evaluated students: 31

A	B	C	D	E	FX
80,65	6,45	12,9	0,0	0,0	0,0

Lecturers: prof. RNDr. Ján Filo, CSc.

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/2-MAT-114/15	Integral Transforms and Special Functions

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: 1., 3.

Educational level: II.

Prerequisites:

Course requirements:
midterm test,
final exam
Scale of assessment (preliminary/final): 33/67

Learning outcomes:
Students will learn methods of integral transforms and basic properties of some special functions from the point of view of applications in solving differential equations.

Class syllabus:
Fourier transform, Laplace transform, Bessel functions, Legendre polynomials and their applications.

Recommended literature:
Mathematical physics: Basic equations and special functions / Vasilij Jakovlevič Arsenin ; in Slovak, translated by Jozef Kačur. Bratislava : Alfa, 1977,
Fourier series and integral transforms / Allan Pinkus, Samy Zafrany. Cambridge : Cambridge University Press, 1997

Languages necessary to complete the course:
Slovak, English

Notes:

Past grade distribution
Total number of evaluated students: 41

A	B	C	D	E	FX
46,34	26,83	7,32	2,44	4,88	12,2

Lecturers: Dr. Hana Šmitala Mizerová

Last change: 12.03.2022

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.KDMFI+KAI/2-MXX-131/21	International Team-based Research Project

Educational activities:
Type of activities: course / independent work
Number of hours:
per week: 3 **per level/semester:** 39 / 30s
Form of the course: on-site learning

Number of credits: 5

Recommended semester: 1., 7.

Educational level: II.

Prerequisites:

Course requirements:
Continuous assessment: active participation in research in an international student team (25%), presentation of work in a workshop (25%), scientific article (50%)
Indicative evaluation scale: A 90 %, B 80 %, C 70 %, D 60 %, E 50 %
Scale of assessment (preliminary/final): 100/0

Learning outcomes:
Students will learn in the team to agree on a common research topic, formulate research questions, determine research methods for the problem, collect and evaluate data, discuss their findings, present research results to the professional public, analyze and evaluate the scientific work of their colleagues, prepare a scientific article suitable for publication

Class syllabus:
- Research methodology
- Design and implementation of a research project in an international group (preferably interdisciplinary)
- Methods and tools for collaboration in virtual space, collaboration in science and practice
- Academic writing, presentation of research results through scientific articles; objectives, content and structure of scientific articles; forms of academic publication, publication forums and evaluation of their quality
- Quality assurance and feedback - peer review
- Communication of results through posters or conference presentations

Recommended literature:
- Teachers' own electronic study materials published on the course website or in the Moodle system
- Gavora, Peter a kol. 2010. Elektronická učebnica pedagogického výskumu. [online]. Bratislava : Univerzita Komenského, 2010. Dostupné na: http://www.e-metodologia.fedu.uniba.sk/ ISBN 978–80–223–2951–4.

- Tharenou, P., Donohue, R. and Cooper, B., 2007. Management research methods. Cambridge University Press.
- Topping, A., 2015: The Quantitative-Qualitative Continium. In: Gerrish, K. and Lathlean, J., The Research Process in Nursing, p. 159-172
- Williamson, K. and Johanson, G. eds., 2017. Research methods: Information, systems, and contexts. Chandos Publishing.

Languages necessary to complete the course:
English

Notes:

Past grade distribution
Total number of evaluated students: 8

A	B	C	D	E	FX
75,0	0,0	0,0	0,0	25,0	0,0

Lecturers: doc. RNDr. Zuzana Kubincová, PhD., doc. RNDr. Martin Homola, 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/2-MAT-224/09	Linear Codes

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: 4

Recommended semester: 1.

Educational level: II.

Prerequisites:

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 be able to create and use basic linear codes designed to protect data against errors introduced via transmission and storage. They will also be able to evaluate the advantages and disadvantages of specific codes with regard to the conditions of their usage and the expected amount of transmitted information.

Class syllabus:
Fundamental concepts ond examples from the theory of linear codes. Generating matrix and parity check matrix of a linear code. Error detection and correction. Standard decoding. Perfect codes. Hamming codes.
Cyclic codes. Generating polynome and parity check polynome. BCH codes. Reed-Solomon codes. Decoding of cyclic codes.

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: 74					
A	B	C	D	E	FX
82,43	13,51	2,7	0,0	1,35	0,0
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.KAMŠ/2-PMS-118/22	Markov Models (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: II.

Prerequisites:

Course requirements:
Preliminary semester evaluation: test(20%) and homeworks(50%)
Examination: written examination(30%)
Approximate grade thresholds: A 90%, B 80%, C 70%, D 60%, E 50%

Learning outcomes:
After completing the course the student will master elementary discrete time Markov chains models. He will be able to classify states of a Markov chain and calculate stationary probability distributions.

Class syllabus:
Markov property, transition probabilities, transition matrix, Chapman Kolmogorov equation, irreducibility of a chain. Classification of states, recurrent states, transient states, null recurrent states and positive recurrent states, periodicity. Existence of stationary distribution, ergodic distribution, necessary and sufficient conditions for ergodicity. Random walks, branching processes, absorbtion probabilities, mean time to absorbtion. Markov reward chains algorithms and Markov Chain Monte Carlo.

Recommended literature:
Kalas, J: Markovove reťazce, skriptá MFF UK
Norris, J.R.: Markov chains (1998)
Ross, S.M.: Introduction to probability models (2006)

Languages necessary to complete the course:

Notes:

Past grade distribution
Total number of evaluated students: 290

A	B	C	D	E	FX
23,45	22,07	25,86	19,66	7,93	1,03

Lecturers: doc. RNDr. Katarína Janková, CSc.

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/2-PMS-119/22	Markov Models (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: II.

Prerequisites:

Course requirements:
20% test(teaching period), 30% homeworks(teaching period), 50% examination
Approximate grade thresholds: A 90%, B 80%, C 70%, D 60%, E 50%

Learning outcomes:
After completing the course students will know properties of homogeneous Markov chains with continuous time. They will be able to use models based on these chains.

Class syllabus:
Markov property for continuous time chains, probabilities of transition, initial distribution, Chapman Kolmogorov equation. Forces of transition and their properties, backward and forward systems of Kolmogorov differential equations. Statioanary and ergodic distribution of the chain. Models of linear growth, birth and death chains, Poisson process. Characterization of processes using jump chain and holding times. Queueing systems: M/M/n, M/M/infinity. Imbedded chain technique for M/G/1. Pollaczek Chinchin formula.

Recommended literature:
Janková, K., Kilianová, S., Brunovský, P., Bokes, P.: Markovove reťazce a ich aplikácie. Epos 2014.
Norris, J.:Markov Chains.Cambridge University Press 1997.

Languages necessary to complete the course:

Notes:

Past grade distribution
Total number of evaluated students: 128

A	B	C	D	E	FX
28,13	15,63	25,78	23,44	5,47	1,56

Lecturers: doc. RNDr. Katarína Janková, CSc.

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.KTF/1-FYZ-677/15	Mathematical Physics

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: 7

Recommended semester: 1.

Educational level: I., II.

Prerequisites:

Course requirements:
Continuous assessment: homework
Examination: two written exams during the semester
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 material contained in the Brief syllabus.

Class syllabus:
Fundamentals of analysis on manifolds (tensor fields, Lie derivatives, Killing fields, ...) and introduction to the theory of Lie groups and Lie algebras and their representations. Group actions, homogeneous spaces.

Recommended literature:
Differential geometry and Lie groups for physicists / Marián Fecko. Cambridge : Cambridge University Press, 2006
Crampin,Pirani: Applicable differential geometry, CUP 1986

Languages necessary to complete the course:
Slovak, English

Notes:

Past grade distribution
Total number of evaluated students: 74

A	B	C	D	E	FX
51,35	18,92	14,86	5,41	6,76	2,7

Lecturers: doc. RNDr. Marián Fecko, PhD.

Last change: 11.08.2022

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/2-MAT-951/15	**Course title:** Mathematics
Number of credits: 6	
Educational level: II.	
Learning outcomes: The result of successful completion of the state subject will be the completion of the final state examination in the subject Mathematics	
Class syllabus: The exam in the subject Mathematics consists of a colloquial exam, verifying the theoretical knowledge of the study program and verifying the ability to solve a given problem. The content of the exam corresponds to the choice of one of the three state blocks of compulsory elective courses: Block A: Mathematical analysis Block B: Mathematical Structures a Block C: Numerical mathematics.	
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.KAMŠ/2-MAT-311/15	Non-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: 1.

Educational level: II.

Prerequisites:

Course requirements:
Continuous assessment: exercises 30%, project: 20%, Final exam: 50%. Grading: A (100-91), B (90-81), C (80-71), D (70-61), E (60-51), Fx (50-0).
Scale of assessment (preliminary/final): 50% / 50%

Learning outcomes:
Student has mastered the basics of nonlinear programming theory and methods.

Class syllabus:
Lagrange function and its properties, Lagrange duality, Transformations of optimization problems, Generalization of Lagrange function, Roode axioms, Min-max theorem, General principle of duality, Convex, quasiconvex and strong convex functions, Optimality conditions, Lagrange and Kuhn-Tucker theorem, Duality thoery in convex programming, Slater theorem, Interior point methods - introduction.

Recommended literature:
Nelineárne programovanie, teória a algoritmy / Milan Hamala, Mária Trnovská. Bratislava : EPOS, 2013
S. Boyd, L. Vandenberghe: Convex Optimization, Cambridge University Press, 2004.

Languages necessary to complete the course:

Notes:

Past grade distribution
Total number of evaluated students: 13

A	B	C	D	E	FX
46,15	7,69	23,08	7,69	15,38	0,0

Lecturers: doc. RNDr. Mária Trnovská, 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/2-MAT-122/15	Nonlinear Functional Analysis

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: II., III.

Prerequisites:

Course requirements:
Continuous assessment: handwriting
Exam: oral
Original rating scale: A 90%, B 80%, C 70%, D 60%, E 50%
Scale of assessment (preliminary/final): 40/60

Learning outcomes:
Fundamentals of nonlinear analysis, differential calculus in Banach spaces, bifurcation theory and continuous methods.

Class syllabus:
1. Differential calculus in Banach spaces.
2. Local nonlinear analysis: Uniform contraction theorem and implicit function theorem.
3. Bifurcation theory: Lyapunov - Schmidt reduction.
4. Continuous methods for solving nonlinear equations.

Recommended literature:
Lectures on nonlinear analysis / Pavel Drábek, Jaroslav Milota. Plzeň : Vydavateľstvo servis, 2004
Nonlinear differential equations and dynamical systems / Ferdinand Verhulst. Berlin : Springer, 1990
Nelineární diferenciální rovnice / Svatopluk Fučík, Alois Kufner. Praha : Státní nakladatelství technické literatury, 1978

Languages necessary to complete the course:

Notes:

Past grade distribution
Total number of evaluated students: 14

A	ABS	B	C	D	E	FX	NEABS
85,71	0,0	0,0	0,0	0,0	0,0	14,29	0,0

Lecturers: prof. RNDr. Michal Fečkan, DrSc.

Last change: 12.03.2022

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/2-MAT-624/09	Number Theory (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: 2.

Educational level: II.

Prerequisites:

Course requirements:
Homework and an oral exam
Grading: A 90%, B 80%, C 70%, D 60%, E 50%, Fx < 50%
Scale of assessment (preliminary/final): Semester 20% (homework assignments) / 80% final exam (oral exam).

Learning outcomes:
Students will learn to solve basic types of Diophantine equations. They will be able to use various types of densities to compare various subsets of the set of positive integers.

Class syllabus:
Various types of densities (Schnirelman, asymptotic and logarithmic density). Diophantine equations and Pythagorean triples. Results on expressing integers as sums of squares. Minkowski theorem. Cantor's expansions of real numbers. Proofs of rrationality of some real numbers.

Recommended literature:
Elementary number theory / Gareth A. Jones, J. Mary Jones. London : Springer, 1998

Languages necessary to complete the course:

Notes:

Past grade distribution
Total number of evaluated students: 44

A	B	C	D	E	FX
90,91	4,55	0,0	2,27	0,0	2,27

Lecturers: RNDr. Martin Sleziak, 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/2-MAT-323/25	Numerical Analysis of Partial Differential Equations (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: 4

Recommended semester: 2.

Educational level: II.

Prerequisites: FMFI.KMANM/2-MAT-325/12 - Variational Methods in Differential Equations

Course requirements:

Learning outcomes:
Completing the course students will acquire basic knowledge of classical numerical methods for solving elliptic, parabolic and hyperbolic partial differential equations with the focus on convergence analysis and error estimates.

Class syllabus:
Variational formulation for linear elliptic boundary value problems; Ritz and Galerkin methods (Lemma of Cea); construction of basis functions for finite-dimensional approximation spaces; local and global variational formulation; assembling; convergence; error estimates for 1D and 2D linear interpolation.

Recommended literature:
J. Kačur: Numerické metódy riešenia PDR (electronic version)
P. G. Ciarlet: The finite element method for elliptic problems, North Holland, 1978
C. Johnson: Numerical solution of PDE by finite element method. Cambridge University Press, 1988

Languages necessary to complete the course:

Notes:

Past grade distribution
Total number of evaluated students: 46

A	B	C	D	E	FX
43,48	26,09	17,39	8,7	0,0	4,35

Lecturers: Dr. Hana Šmitala Mizerová

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.KMANM/2-MAT-334/25	Numerical Analysis of Partial Differential Equations (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: 3.

Educational level: II.

Prerequisites: FMFI.KMANM/2-MAT-323/09 - Finite Element Method (1) or FMFI.KMANM/2-MAT-323/25 - Numerical Analysis of Partial Differential Equations (1)

Course requirements:
Scale of assessment (preliminary/final): 30/70

Learning outcomes:
Completing the course students will acquire basic knowledge of classical numerical methods for solving parabolic and hyperbolic partial differential equations with the focus on convergence analysis and error estimates.

Class syllabus:
variational crimes (1. and 2. Strang's lemma; approximation of boundary conditions; nonconformal FEM); mixed FEM (approximation of saddle point problem, inf-sup condition); adaptive mesh-refinement method (a posteriori error estimates); finite volume method; fluid flow models

Recommended literature:
J. Kačur: Numerické metódy riešenia PDR (v elektronickej forme)
C. Johnson: Numerical solution of PDE by the FEM, Cambridge University Press, 1987
P.G. Ciarlet: The Finite Element Method for Elliptic Problems, North-Holland, Amsterdam, 1978
G. Strang: Variational crimes in the FEM, The Mathematical Foundations of the Finite Element Method with Applications to Partial Differential Equations 1972, p. 689-710
S.C. Brenner, L.R. Scott: The mathematical theory of FEM, Springer New York, 2008

Languages necessary to complete the course:

Notes:

Past grade distribution
Total number of evaluated students: 31

A	B	C	D	E	FX
51,61	3,23	22,58	9,68	9,68	3,23

Lecturers: Dr. Hana Šmitala Mizerová

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.KMANM/2-MAT-327/12	Numerical Modelling in Optimization Problems

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: 3.

Educational level: II.

Prerequisites:

Course requirements:
Indicative assessment 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 be able to solve practical problems by modern methods.

Class syllabus:
Solution (in matlab) by method: simplex, primary-dual, internal point, quadratic and convex programming, Frank-Wolfe, Rosen, penalty, berier.

Recommended literature:
R.Fletcher"Practical Methods of Optimization, Wiley,New York, 1987
S.J. Wright:Primal-Dual Interior –Point Methods. SIAM, Philadelphia, 1997

Languages necessary to complete the course:
Slovak, English

Notes:

Past grade distribution
Total number of evaluated students: 21

A	B	C	D	E	FX
76,19	4,76	4,76	4,76	4,76	4,76

Lecturers: prof. RNDr. Jozef Kačur, DrSc., 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: FMFI.KMANM/2-MAT-112/15	**Course title:** Partial 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: 1.	
Educational level: II.	
Prerequisites:	
Recommended prerequisites: 1-MAT-410 Functional analysis (1) AND 1-MAT-411 Functional analysis (2) AND 1-MAT-430 Classical methods of solving partial differential equations AND 1-MAT-785 Measure theory and integration	
Course requirements: Preliminary evaluation: 1 written partial exam (50%) and home work (50%) Final exam: written (55%)/oral (45%) Indicative evaluation scale: A 90%, B 80%, C 70%, D 65%, E 55% Scale of assessment (preliminary/final): 40/60	
Learning outcomes: After completing the course, students will gain basic knowledge and skills of theory of weak solutions to elliptic partial differential equations, boudary-value problems and elements of Sobolev spaces.	
Class syllabus: Sobolev spaces: definition, elementary properties, approximation by smooth functions, traces, basic inequalities, imbeddings, some special properties. Linear second-order elliptic partial differential equations: weak solutions, existence and unicity, regularity, maximum principles, eigenvalues and eigenfunctions.	
Recommended literature: Partial differential equations / Lawrence C. Evans. Providence : American Mathematical Society, 1998	
Languages necessary to complete the course: Slovak, English	
Notes:	

Past grade distribution Total number of evaluated students: 21					
A	B	C	D	E	FX
28,57	14,29	28,57	19,05	9,52	0,0
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.KAMŠ/2-MAT-121/09	Partial Differential Equations (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: II.

Prerequisites:

Course requirements:
Continuous assessment: homework sets and midterm exam
Final exam: written and oral exam
Grade scale: A 90%, B 80%, C 70%, D 60%, E 50%
Scale of assessment (preliminary/final): 65/35

Learning outcomes:
Upon successful completion of this course, students will gain knowledge of the basic properties of parabolic and hyperbolic partial differential equations with emphasis on the qualitative properties of their solutions, including rigorous derivation of the relevant theory. They will get acquainted with the concept of the weak solution of evolutionary partial differential equations. Students will also gain basic knowledge about the phenomena appearing in nonlinear partial equations - about dispersive and traveling waves and their stability.

Class syllabus:
Heat conduction equation in one and more dimensions, self-similar solutions, fundamental solution, derivation of heat conduction equation from Brownian motion, maximum principle for parabolic problems, solution regularity, weak formulation of parabolic equations, regularity of weak solutions, wave equation, hyperbolic and dispersion waves, reaction-diffusion equations, existence and stability of traveling waves

Recommended literature:
Partial differential equations / Lawrence C. Evans. Providence : American Mathematical Society, 1998

Languages necessary to complete the course:

Notes:

Past grade distribution Total number of evaluated students: 39					
A	B	C	D	E	FX
35,9	25,64	10,26	12,82	15,38	0,0
Lecturers: doc. Mgr. Richard Kollár, PhD.					
Last change: 13.03.2022					
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.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., 7.

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., 8.

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/2-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: 2

Recommended semester: 1., 7.

Educational level: I.II., II.

Prerequisites:

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

Learning outcomes:

Class syllabus:
Practicing of the students´ game skills in collective sports: basketball, volleyball, football, floorball and hockey. Mastering of the basic technique of a particular sport discipline in other sports. In paddling, basic training on still and slightly flowing water. Development of coordination skills, improvement of articular mobility and cardiovascular system.

Recommended literature:

Languages necessary to complete the course:
Slovak, English

Notes:

Past grade distribution
Total number of evaluated students: 1911

A	B	C	D	E	FX
97,65	0,63	0,05	0,0	0,0	1,67

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.KTV/2-MXX-120/00	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: 2

Recommended semester: 2., 8.

Educational level: I.II., II.

Prerequisites:

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

Learning outcomes:

Class syllabus:
Practicing of offensive and defensive game combinations and playing with modified rules in collective sports such as basketball, volleyball, football, floorball, hockey. Command of elements of higher difficulty in locomotion skills (swimming - crawl stroke, breast stroke, butterfly stroke, trampoline jumping and aerobics – practicing of areobics compositions, bodybuilding – development of the main muscle groups, paddling on running water. Testing of the level of physical fitness and coordination skills.

Recommended literature:

Languages necessary to complete the course:
Slovak, English

Notes:

Past grade distribution
Total number of evaluated students: 1797

A	B	C	D	E	FX
98,44	0,33	0,06	0,06	0,06	1,06

Lecturers: Mgr. Martin Dovičák, PhD., Mgr. Tomáš Kuchár, PhD., Mgr. Jana Leginusová, PaedDr. Dana Mašlejová, Mgr. Ladislav Mókus, Mgr. Branislav Nedbálek, PhD., PaedDr. Mikuláš Ortutay, Mgr. Júlia Raábová, 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/2-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., 9.

Educational level: I.II., II.

Prerequisites:

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

Learning outcomes:

Class syllabus:
To improve offensive and defensive game combinations in collective sports. Practicing of tactical and technical elements in individual sports. Compensatory exercises to correct wrong body posture. Stretching. Competition rules in sport disciplines.

Recommended literature:

Languages necessary to complete the course:
Slovak, English

Notes:

Past grade distribution
Total number of evaluated students: 1454

A	B	C	D	E	FX
98,56	0,41	0,07	0,0	0,07	0,89

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.KTV/2-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., 10.

Educational level: I.II., II.

Prerequisites:

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

Learning outcomes:

Class syllabus:
Sport training for Faculty Championships in a selected sport with modified rules. Selection of sport-talented students into teams of the Faculty Sport League, University League of Bratislava Faculties, and participation in sport events of the Faculty and University.

Recommended literature:

Languages necessary to complete the course:
Slovak, English

Notes:

Past grade distribution
Total number of evaluated students: 1267

A	B	C	D	E	FX
98,34	0,39	0,08	0,08	0,08	1,03

Lecturers: PaedDr. Dana Mašlejová, Mgr. Ladislav Mókus, Mgr. Jana Leginusová, Mgr. Tomáš Kuchár, PhD., PaedDr. Mikuláš Ortutay, Mgr. Martin Dovičák, PhD., Mgr. Branislav Nedbálek, PhD., Mgr. Júlia Raábová, 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/2-EFM-152/15	Principles of Mathematical Modelling in Science and Engineering

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: 3.

Educational level: II.

Prerequisites:

Course requirements:
Interim assessment during the semester has a weight of 40% (homeworks 30%, bonus exercises 10%). The two semester exam papers have a total weight of 60% (the first paper taken in the middle of the semester, the second paper taken at the end of the semester). The student must obtain at least half of the points from each semester exam paper. The final evaluation can be adjusted by an oral exam (theoretical questions, written preparation).
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 the intermediate / final evaluation: 40/60

Learning outcomes:
By completing this course, the student will gain knowledge of the principles of mathematical modeling of phenomena in the natural and technical sciences.

Class syllabus:
Basic principles of modeling.
Principle of nondimensionalisation. Buckingham Pi-theorem. Dimensionless parameters.
Asymptotic expansion, convergence vs. divergence, uniformity. Matched asymptotic approximations.
Application of asymptotic methods: Van der Pol oscillator.
Heat transfer model. Degenerate diffusion.
Material derivative. Vorticity. Viscous flow.
Flow instability and transition to turbulence.

Recommended literature:
A. C. Fowler, Mathematical Models in the Applied Sciences, Cambridge University Press, 1997
A. Quarteroni, P. Gervasio, A Primer on Mathematical Modelling, Springer, 2020

Languages necessary to complete the course:
Slovak, English

Notes:

Past grade distribution Total number of evaluated students: 91					
A	B	C	D	E	FX
58,24	18,68	8,79	5,49	2,2	6,59
Lecturers: doc. RNDr. Peter Guba, 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.KTF/2-FTF-111/16	Representations of Groups

Educational activities:
Type of activities: lecture / practicals
Number of hours:
per week: 4 / 1 **per level/semester:** 52 / 13
Form of the course: on-site learning

Number of credits: 7

Recommended semester: 4.

Educational level: II.

Prerequisites:

Course requirements:
Homework and exam.
Scale of assessment (preliminary/final): 40/60

Learning outcomes:
Upon completion, students will understand the basics of the representation theory of finite and Lie groups and applications in theoretical physics.

Class syllabus:
Representations of finite groups, characters, Pontryagin's dual, Fourier analysis on finite groups, Frobeni's theory of representations of semi-direct products, representations of symmetric groups. Representations of Lie groups, linearization, structure of Lie algebras, representations of simple Lie algebras, Clifford algebras, BCH formula, local and global integration of representations of Lie algebras, Peter-Weyl theorem and non-abelian Fourier analysis, Wigner theorem, projective representations, representations of Poincaré group, mass, spin, helicity, relationship of quantum fields and particles.

Recommended literature:
Fulton, Harris - Representation Theory, A First Course, Springer, 1991.
Simon - Representations of Finite and Compact Groups, AMS, 1996.
Hall - Lie Groups, Lie Algebras, and Representations, Springer, 2003.

Languages necessary to complete the course:

Notes:

Past grade distribution
Total number of evaluated students: 35

A	B	C	D	E	FX
65,71	5,71	17,14	2,86	5,71	2,86

Lecturers: Mgr. Martin Kršák

Last change: 25.02.2022
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-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., 7.

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., 8.

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., 9.

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., 10.

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.KAG/2-MAT-619/09	Selected Chapters in the Theory of Functions of Complex Variable

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: 3.

Educational level: II.

Prerequisites:

Recommended prerequisites:
1-MAT-416 or 1-FYZ-225 - introduction to methods of complex analysis

Course requirements:
Semester: homework, presentation
Approximate grade scheme: A 90%, B 80%, C 70%, D 60%, E 50%
Scale of assessment (preliminary/final): 100/0

Learning outcomes:
Students will expand their knowledge of the theory of functions of complex variable with regard to applications in PDR, analytical number theory, special functions, geometry, topology, etc.
With the help of homework sets, they will gain practical skills in advanced computation techniques and proofs.

Class syllabus:
Cauchy type integrals, principal value integral, Hilbert and Fourier transforms, analytic continuation, compactness for families of analytic functions, infinite series (Mittag-Leffler's theorem), infinite products (Weierstrass factorization), Gamma function, Stirling's formula, Riemann Zeta function, conformal maps, Riemann mapping theorem, elliptic functions, modular forms, Riemann surfaces and global analytic functions, branching points, Picard theorem, etc.
Covered topics could be customized to match students' interests.

Recommended literature:
M. Ablowitz, A. Fokas: Complex variables. Introduction and Applications, Cambridge Texts in Applied Mathematics, 2003
L. V. Ahlfors: Complex Analysis, McGraw-Hill, New York, 1979.
E. Stein, R. Shakarchi: Complex Analysis, Princeton University Press, 2003
A. I. Markushevich: Theory of functions of complex variable, Chelsea, New York, 1977

Languages necessary to complete the course:
English, Slovak

Notes:
The course can also be taught in English.
The course might not run every year.

Past grade distribution
Total number of evaluated students: 16

A	B	C	D	E	FX
81,25	12,5	0,0	6,25	0,0	0,0

Lecturers: Mgr. Martin Niepel, 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/2-MAT-231/09	Selected Topics in Cryptology

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: 4

Recommended semester: 3.

Educational level: II.

Prerequisites:

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 principles of cryptographic protocols, will be able to evaluate the required levels of secrecy with regard to the security situation requirements, they will be familair with the basic principles of cryptographic attacks and corresponding defenses. Students will be familiar with classical cryprographical set-ups and protocols and their respective strengths and weaknesses.

Class syllabus:
A brief historical introduction and examples of crypto systems. Summary of relevant basic facts from number theory and algebra (congruencies, rings of modulo arithmetic, the Chines remained theorem). Definition and examples of crypto systems. Symmetric and asymmetric crypto systems. Cryptanalysis. Affine block codes and their cryptanalysis. DES-algorithms. Public-key crypto systems and the RSA method (potentially other methods as well). Hash functions and their usage in digital signature.

Recommended literature:
Cryptography : Theory and practice / Douglas R. Stinson. Boca Raton, Fla. : Chapman & Hall, 2006
Algebraic aspects of cryptography / Neal Koblitz. Berlin : Springer, 1998

Languages necessary to complete the course:
Slovak, English

Notes:

Past grade distribution
Total number of evaluated students: 45

A	B	C	D	E	FX
97,78	2,22	0,0	0,0	0,0	0,0

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/2-MAT-626/19	Selected Topics of Algebraic 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: 3.

Educational level: II.

Prerequisites: FMFI.KAG/2-MAT-223/09 - Algebraic Topology

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

Learning outcomes:
Students will expand their knowledge of algebraic topology with topics that could not be covered within the course Algebraic topology, such as homological algebra, Poincaré duality and basics of homotopy theory.

Class syllabus:
Homological algebra: universal coefficient theorems, Kuenneth's theorem. Cohomology ring, calculations in some specific cases. Poincaré's duality and its application to manifolds. Higher homotopy groups. Fibrations and cofibrations. Hurewicz's theorem. Whitehead's theorem. Moore-Postnikov's towers. Blakers-Massey theorem. Stable homotopy groups. Spectra in the sense homotopy theory. Generalized homology and cohomology theories. Spectral sequences. Cobordisms. Characteristic classes. K-theory. Morse theory. Surgery.
The choice of topics can be tailored to the interests of students.

Recommended literature:
A. Hatcher: Algebraic Topology

Languages necessary to complete the course:
Slovak, English

Notes:
The course may be taught in English. It may not be offered every year.

Past grade distribution
Total number of evaluated students: 5

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

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.KMANM/2-MAT-132/15	Selected Topics of Mathematical Physics

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: 4.

Educational level: II.

Prerequisites:

Course requirements:
Interim evaluation: independent work, homework,
Grades: A (100-91), B (90-81), C (80-71), D (70-61), E (60-51), Fx (50-0).
Scale of assessment (preliminary/final): 100/0

Learning outcomes:
The student will be able to formulate mathematical models of problems of mechanics and electromagnetism.

Class syllabus:
Newton's laws. Lagrange's formulation of mechanics. Newton's / Coulomb's law. Electromagnetic field and Maxwell's equations.

Recommended literature:
Mechanika / L. D. Landau, Je. M. Lifšic. Moskva : Nauka, 1973
Mechanika / Jozef Kvasnica ... [et al.]. Praha : Academia, 2004
Teoretická mechanika / Miroslav Brdička, Arnošt Hladík. Praha : Academia, 1987
Theoretical mechanics / T. C. Bradbury. New York : John Wiley, 1968
Úvod do teoretickej fyziky 1 : Mechanika, Elektrodynamika / Lev Davidovič Landau, Jevgenij Michajlovič Lifšic ; z ruského originálu preložil Juraj Šebesta. Bratislava : Alfa, 1980

Languages necessary to complete the course:
Slovak, English

Notes:

Past grade distribution
Total number of evaluated students: 12

A	B	C	D	E	FX
83,33	16,67	0,0	0,0	0,0	0,0

Lecturers: doc. RNDr. Michal Demetrian, 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.KAG/2-MAT-313/19	Selected Topics of Numerical Algebra

Educational activities:
Type of activities: course
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: II.

Prerequisites:

Recommended prerequisites:
1-MAT-530 Numerical Methods of Linear Algebra

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

Learning outcomes:
Students will get acquainted with theoretical foundations of advanced techniques in numerical linear algebra and at the same time gain practical experience with programming computational algorithms.

Class syllabus:
Spectral theory: eigenvalue problems, Schur factorization, power method, QR-algorithm, eigenvalue problems for symmetric matrices - Min-max theorem, QR-algorithm for symmetric matrices, Rayleigh-Ritz projection, subspace iterations, Krylov methods, GMRES , Arnoldi and Lanczos iteration, Golub-Kahan-Lanczos bidiagonalization.
Randomized numerical linear algerba: current algorithms for big data processing based on a randomized sampling, accuracy estimates, parallelization of calculations, etc.

Recommended literature:
L. N. Trefethen, D. Bau: Numerical Linear Algebra, SIAM, 1997
P-G. Martinsson, J. A. Tropp: Randomized Numerical Linear Algebra: Foundations & Algorithms
Carl D. Meyer: Matrix Analysis and Applied Linear Algebra, SIAM, 2001
Gene Golub, Charles Van Loan: Matrix Computations, John Hopkins, 2012

Languages necessary to complete the course:
English, Slovak

Notes:

Past grade distribution
Total number of evaluated students: 6

A	B	C	D	E	FX
33,33	33,33	16,67	16,67	0,0	0,0

Lecturers: doc. RNDr. Andrej Ferko, PhD., Mgr. Martin Niepel, 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/2-MAT-217/22	Seminar in Algebra

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: 3

Recommended semester: 1.

Educational level: II.

Prerequisites:

Recommended prerequisites:
FMFI.KAG/2-MAT-457/22 Algebra (4)

Course requirements:
presentations, quality and depth of understanding
A - 91%+
B - 81%-90%
C - 71%-80%
D - 61%-70%
E - 50%-60%
Fx - less than 50%

Learning outcomes:
Students will gain experience with some more advanced methods used in the field of polynomial rings of several variables and their ideals (algebraic geometry), with universal constructions in the form of tensor product of modules. They will also get acquainted with the introductory concepts of the lattice theory and universal algebra.

Class syllabus:
Rings of integers, extensions of homomorphisms. Algebraic independence. Hilbert's theorem of zeros (Hilbert's Nullstellensatz).
Exact sequences, tensor product of modules.
Basic concepts of lattice theory, distributive and modular lattices, complete and algebraic lattices, closure operators. Basic concepts of universal algebra.

Recommended literature:
Algebra (Third revised revision)/ S. Lang, Springer-Verlag New York 2002
Introduction to Commutative algebra / M. F. Atiyah, I. G. Macdonald, Addison-Wesley Publ. Company 1969
A course in Universal Algebra (Millenium Edition, 2012 Update) / S. Burris and H.P. Sankappanavar, free book
Teacher's electronic text, manuscript

Languages necessary to complete the course:
slovak, english

Notes:

Past grade distribution
Total number of evaluated students: 9

A	B	C	D	E	FX
88,89	0,0	11,11	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/2-MAT-620/09	Seminar in Algebraic and Differential Topology (1)

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: 3

Recommended semester: 3.

Educational level: II.

Prerequisites:

Course requirements:
Semester: talk/presentation
Indicative grading scheme: A 90%, B 80%, C 70%, D 60%, E 50%
Scale of assessment (preliminary/final): 100/0

Learning outcomes:
Students will gain qualified understanding of ideas, approaches, methods and results in selected topics of algebraic and differential topology.

Class syllabus:
Algebraic topology. Theory of manifolds and cellular complexes.
Global analysis, analysis on manifolds.

Recommended literature:
Handbook of Algebraic Topology (edited by I. James), Elsevier, Amsterdam 1995.
Handbook of Global Analysis (edited by D. Krupka and D. Saunders), Elsevier, Amsterdam 2007/2008.

Languages necessary to complete the course:
English, Slovak

Notes:

Past grade distribution
Total number of evaluated students: 7

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

Lecturers: Mgr. Martin Niepel, PhD., doc. Mgr. Tibor Macko, 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/2-MAT-625/09	Seminar in Algebraic and Differential Topology (2)

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: 3

Recommended semester: 4.

Educational level: II.

Prerequisites:

Course requirements:
Semester: talk/presentation
Indicative grading scheme: A 90%, B 80%, C 70%, D 60%, E 50%
Scale of assessment (preliminary/final): 100/0

Learning outcomes:
Students will gain qualified understanding of ideas, approaches, methods and results in selected topics of algebraic and differential topology.

Class syllabus:
Algebraic topology. Theory of manifolds and cellular complexes.
Global analysis, analysis on manifolds.

Recommended literature:
Handbook of Algebraic Topology (edited by I. James), Elsevier, Amsterdam 1995.
Handbook of Global Analysis (edited by D. Krupka and D. Saunders), Elsevier, Amsterdam 2007/2008.

Languages necessary to complete the course:
English, Slovak

Notes:

Past grade distribution
Total number of evaluated students: 4

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

Lecturers: Mgr. Martin Niepel, PhD., doc. Mgr. Tibor Macko, 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.KI/2-MAT-602/09	Seminar in Graph Theory (1)

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: 3

Recommended semester: 1.

Educational level: 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: 14

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

Lecturers: prof. RNDr. Martin Škoviera, 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.KI/2-MAT-611/09	Seminar in Graph Theory (2)

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: 3

Recommended semester: 2.

Educational level: 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: 13

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

Lecturers: prof. RNDr. Martin Škoviera, 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.KAG/2-MAT-603/09	Seminar in Number Theory (1)

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: 3

Recommended semester: 1.

Educational level: II.

Prerequisites:

Course requirements:
Presentations and talks at the seminar.
Grading: A 90%, B 80%, C 70%, D 60%, E 50%, Fx < 50%
Scale of assessment (preliminary/final): Semester 100% (presentations)

Learning outcomes:
Students will be able to work with scientific literature in the area of number theory.

Class syllabus:
Presentations of papers, book chapters and possibly even own work of the participants.

Recommended literature:
Selection of papers from this area.

Languages necessary to complete the course:

Notes:

Past grade distribution
Total number of evaluated students: 16

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

Lecturers: RNDr. Martin Sleziak, 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/2-MAT-612/09	Seminar in Number Theory (2)

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: 3

Recommended semester: 2.

Educational level: II.

Prerequisites:

Course requirements:
Presentations and talks at the seminar.
Grading: A 90%, B 80%, C 70%, D 60%, E 50%, Fx < 50%
Scale of assessment (preliminary/final): Semester 100% (presentations)

Learning outcomes:
Students will be able to work with scientific literature in the area of number theory.

Class syllabus:
Presentations of papers, book chapters and possibly even own work of the participants.

Recommended literature:
Selection of papers from this area.

Languages necessary to complete the course:

Notes:

Past grade distribution
Total number of evaluated students: 14

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

Lecturers: RNDr. Martin Sleziak, 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.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., 7.

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., 8.

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., 9.

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., 10.

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/2-MAT-307/11	Solutions of Tasks in Optimal Management and of Inversion Problems

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: 1.

Educational level: II.

Prerequisites:

Course requirements:
Scale of assessment (preliminary/final): 50/50

Learning outcomes:

Class syllabus:
Motivating models and formulation of optimal control; minimization methods, differentiation of functionals (differential Gatteaux), Lagrange identity and the adjoint system. Maximum principle of Pontriagin. Numerical approximation of optimal control problems. Solusion of the inverse problems by the method of optimal control. Regularization of ill-posed problems, Tichonoff's regularization. Approximation of optimal control problems by the methods of nonlinear programming . Solution of some models from engineering practice (determination of parameters in heat transfer problems, Stefanovej problem, transport and adsorption).

Recommended literature:
R. P. Fedorenko: Približennoe rešenie zadač optimalnovo upravlenia (rusky) Moskva "Nauka" Fyziko-matematičeskaja literatura 1978.

Languages necessary to complete the course:

Notes:

Past grade distribution
Total number of evaluated students: 34

A	B	C	D	E	FX
52,94	20,59	5,88	5,88	11,76	2,94

Lecturers: prof. RNDr. Jozef Kačur, DrSc., RNDr. Patrik Mihala, 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+KAMŠ/2-MAT-341/15	Solving of Engineering Problems by Numerical Software

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: 4.

Educational level: II.

Prerequisites:

Course requirements:
Continuous assessment: active work on lectures 30 points, 2x individual work 20 points each, project 30 points
Final 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): 100/0

Learning outcomes:
After completing the course, students should be able to practically solve various types of differential equations.

Class syllabus:
An overview of numerical methods for solving engineering models and their program implementation, appling existing software when applied to specific tasks of mathematical physics and engineering practice, work with software LSODA, MATLAB, PLTMG.

Recommended literature:
G. H. Golub, J. M. Ortega: Scientific Computing and Differential Equations: An Introduction to Numerical Methods, Academic Press, 1992
M. H. Holmes: An Introduction to Numerical Methods in Differential Equations, Springer, 2007

Languages necessary to complete the course:
Slovak, English

Notes:

Past grade distribution
Total number of evaluated students: 12

A	B	C	D	E	FX
91,67	8,33	0,0	0,0	0,0	0,0

Lecturers: doc. RNDr. Peter Guba, PhD., Mgr. Jela Babušíková, 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.KTV/2-MXX-115/17	Sports in Natur (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., 7.

Educational level: I.II., 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. 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: 160

A	B	C	D	E	FX
98,75	0,0	0,0	0,0	0,0	1,25

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/2-MXX-116/18	Sports in Natur (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., 8.

Educational level: I.II., 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: 109

A	B	C	D	E	FX
95,41	0,0	0,0	0,0	0,0	4,59

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/2-PMS-123/10	Stochastic Simulation 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: 3.

Educational level: II.

Prerequisites:

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

Learning outcomes:
The students understand the basic methods of computer sampling of random variables and vectors, apply them to the computation of Monte Carlo estimates and use them for the simulation of complex stochastic systems.

Class syllabus:
Generating random numbers, testing of random number generators, Sampling discrete random variables and vectors, Sampling continuous random variables and vectors, Statistical analysis of simulated data, Classical Monte Carlo methods.

Recommended literature:
Ross S: Simulation, Elsevier Academic Press 2006; Study materials of the lecturer.

Languages necessary to complete the course:
Slovak, English

Notes:
Enrollment limit: 40 students

Past grade distribution
Total number of evaluated students: 470

A	B	C	D	E	FX
41,91	25,32	13,83	8,94	6,17	3,83

Lecturers: doc. Mgr. Pavol Bokes, PhD.

Last change: 10.03.2022

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/2-MAT-142/14	Transport, conservation laws and equations of motion

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: 4

Recommended semester: 3.

Educational level: II.

Prerequisites: FMFI.KMANM/2-MAT-112/15 - Partial Differential Equations (1) and FMFI.KAMŠ/2-MAT-121/09 - Partial Differential Equations (2)

Course requirements:
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): 0/100

Learning outcomes:
The graduate of this course has knowledge of the mathematical theory of conservation laws and the equations of motion modeling fluid flow.

Class syllabus:
Transport theorem, continuity equation, equation of motion, conservation law equations, Navier-Stokes equations

Recommended literature:
Partial differential equations / Lawrence C. Evans. Providence : American Mathematical Society, 1998
Miloslav Feistauer, Mathematical methods in fluid dynamics, Longman Scientific & Technical, 1993
John C. Neu, Training Manual on Transport and Fluids, Graduate Studies in Mathematics, Volume 109, AMS.

Languages necessary to complete the course:
Slovak, English

Notes:

Past grade distribution
Total number of evaluated students: 15

A	B	C	D	E	FX
80,0	6,67	6,67	6,67	0,0	0,0

Lecturers: prof. RNDr. Ján Filo, 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.KMANM/2-MMN-140/15	Unconventional Application of Mathematical Analysis

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: 3

Recommended semester: 3.

Educational level: II.

Prerequisites:

Course requirements:
Continuous assessment: individual work, presentation on a given topic.
Scale of assessment (preliminary/final): 100/0

Learning outcomes:
The purpose of the course is to present to students some uncommon applications of modern mathematical analysis, mainly in biology, medicine and social sciences.

Class syllabus:
1. Discrete and continuous models of interactions of biological populations (competitive systems, system "predator-prey", symbiotic systems).
2. Mathematical model of the detection of diabetes.
3. Discrete dynamical systems of mathematical genetics.
4. Epidemic models and dynamics of infectious diseases.

Recommended literature:

Languages necessary to complete the course:
Slovak, English

Notes:

Past grade distribution
Total number of evaluated students: 86

A	B	C	D	E	FX
93,02	6,98	0,0	0,0	0,0	0,0

Lecturers: prof. RNDr. Jaroslav Jaroš, 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.KAG/2-MAT-212/22	Universal Algebras and Lattices (1)

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: 3

Recommended semester: 2.

Educational level: II.

Prerequisites:

Recommended prerequisites:
FMFI.KAG/2-MAT-217/22 Seminar in Algebra

Course requirements:
presentations, quality and depth of understanding
A - 91%+
B - 81%-90%
C - 71%-80%
D - 61%-70%
E - 50%-60%
Fx - less than 50%

Learning outcomes:
Students will gain experience in independent study of advanced mathematical topics and with the presentation of new knowledge. They will know the most important concepts, methods and results from the lattice theory and universal algebra and their connection with the methods and results of "classical" mathematical disciplines.

Class syllabus:
Subdirect products.
Class operators H, S, P, varieties.
Free algebras, terms, fully invariant congruences.
Malcev conditions.
Defining formulas and constructions preservations.

Recommended literature:

Languages necessary to complete the course:
slovak, english

Notes:

Past grade distribution Total number of evaluated students: 41					
A	B	C	D	E	FX
82,93	7,32	7,32	0,0	2,44	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/2-MAT-221/22	Universal Algebras and Lattices (2)

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: 3

Recommended semester: 3.

Educational level: II.

Prerequisites:

Recommended prerequisites:
FMFI.KAG/2-MAT-212/22 Universal Algebras and Lattices (1)

Course requirements:
presentations, quality and depth of understanding
A - 91%+
B - 81%-90%
C - 71%-80%
D - 61%-70%
E - 50%-60%
Fx - less than 50%

Learning outcomes:
Students will gain experience in independent study of advanced mathematical topics and with the presentation of new knowledge. They will know the most important concepts, methods and results from the lattice theory and universal algebra and their connection with the methods and results of "classical" mathematical disciplines. They will be able to follow current research in the field of lattice theory and universal algebra.

Class syllabus:
Boolean algebras, topological representations, Stone's representation theorems.
Equational classes versus varieties, Birkhoff's theorems.
Ultraproducts and filtred products.

Recommended literature:

Languages necessary to complete the course:
slovak, english

Notes:

Past grade distribution
Total number of evaluated students: 29

A	B	C	D	E	FX
86,21	13,79	0,0	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/2-MAT-618/22	Universal Algebras and Lattices (3)

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: 3

Recommended semester: 4.

Educational level: II.

Prerequisites:

Recommended prerequisites:
FMFI.KAG/2-MAT-221/22 Universal Algebras and Lattices (2)

Course requirements:
presentations, quality and depth of understanding
A - 91%+
B - 81%-90%
C - 71%-80%
D - 61%-70%
E - 50%-60%
Fx - less than 50%

Learning outcomes:
Students will gain experience in independent study of advanced mathematical topics and with the presentation of new knowledge. They will know the most important concepts, methods and results from the lattice theory and universal algebra and their connection with the methods and results of "classical" mathematical disciplines. They will be able to follow current research in the field of lattice theory and universal algebra.

Class syllabus:
We shall continue with the literature from previous semester. Topics are selected by students.
Few possibilities:
Free, injective and projective Boolean algebras.
Applications of Boolean algebras in relational systems (automatons, computer science).
Presentations of research papers from leading journals, e.g. Universal Algebra, Order, Semigroup forum.

Recommended literature:

Languages necessary to complete the course:
slovak, english

Notes:

Past grade distribution
Total number of evaluated students: 13

A	B	C	D	E	FX
100,0	0,0	0,0	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.KMANM/2-MAT-325/12	Variational Methods in Differential Equations

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: 4

Recommended semester: 1.

Educational level: II.

Prerequisites:

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

Learning outcomes:
After completing the course, students will be able to solve practical problems using modern methods of functional analysis and PDR.

Class syllabus:
Weak solutions of problems, Sobolev space theory, traces of traces of Lax-Milgram lemma, theorem on equivalent norms, spectral theory, Fredholm's theorem, Galerkin method.

Recommended literature:
C.Johnson: Numerical solutions of PDE,Cambridge University Press Cambridge 1987
J.Kačur: Numerické metódy PDR (pdf v elektronickej podobe)

Languages necessary to complete the course:
Slovak, English

Notes:

Past grade distribution
Total number of evaluated students: 28

A	B	C	D	E	FX
39,29	14,29	14,29	10,71	17,86	3,57

Lecturers: Dr. Hana Šmitala Mizerová

Last change: 15.03.2022

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