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: doc. RNDr. Pavel Chalmovianský, PhD.

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-241/15	Algebraic Geometry (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:

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

Learning outcomes:
The graduate of the course has deeper knowledge of algebraic geometry. They know the basics of the theory of singularities. They are familiar with frequently used classes of algebraic varieties.

Class syllabus:
- Projective space.
- Special algebraic varieties: Veronese varieties, Segre varieties, Grassman varieties and Plücker coordinates, Fano varieties. Determinantial varieties. Bundles of varieties.
- Tangent space. Tangent cone. Regular and singular points.
- Dimension of algebraic variety. Hilbert's polynomial.
- Criteria for parameterization of curves. Genus of the curve.
- Schemes (introduction to theory).

Recommended literature:

Languages necessary to complete the course:
Slovak and English

Notes:

Past grade distribution
Total number of evaluated students: 1

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

Lecturers: RNDr. Jana Chalmovianská, PhD., doc. RNDr. Martin Mačaj, PhD.

Last change: 21.06.2022

Approved by: doc. RNDr. Pavel Chalmovianský, PhD.

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-165/12	Algebraic Geometry Seminar (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: 2

Recommended semester: 1.

Educational level: II.

Prerequisites:

Course requirements:
Presentation on the seminar.
Scale of assessment (preliminary/final): 100/0

Learning outcomes:

Class syllabus:

Recommended literature:

Languages necessary to complete the course:

Notes:

Past grade distribution
Total number of evaluated students: 2

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

Lecturers: doc. RNDr. Pavel Chalmovianský, PhD.

Last change: 22.06.2022

Approved by: doc. RNDr. Pavel Chalmovianský, PhD.

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-166/12	Algebraic Geometry Seminar (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: 2

Recommended semester: 2.

Educational level: II.

Prerequisites:

Course requirements:
Presentation on the seminar.
Scale of assessment (preliminary/final): 100/0

Learning outcomes:

Class syllabus:

Recommended literature:

Languages necessary to complete the course:

Notes:

Past grade distribution
Total number of evaluated students: 2

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

Lecturers: doc. RNDr. Pavel Chalmovianský, PhD.

Last change: 22.06.2022

Approved by: doc. RNDr. Pavel Chalmovianský, PhD.

COURSE DESCRIPTION

Academic year: 2025/2026

University: Comenius University Bratislava

Faculty: Faculty of Mathematics, Physics and Informatics

Course ID:	**Course title:**
FMFI.KI/2-MPG-106/22	Algorithms and Data Structures

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: 4

Recommended semester: 1.

Educational level: II.

Prerequisites:

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

Learning outcomes:

Class syllabus:
An introduction into problem area.
Mathematical foundations (asymptotic notation, standard notations and common functions).
Analysis of algorithms (heapsort, quicksort, sorting in linear time).
Data structures (elementary data structures, hashing tables, binary tries, balanced tries).

Recommended literature:
Aho, Hopcroft, Ullman: The design and analysis of computer algorithms, Adison Wesley 1974.
Niklaus Wirth: Algoritmy a štruktúry údajov, Alfa 1987.
Cormen, Leiserson, Rivest: Introduction to Algorithms, MIT Press 1990.

Languages necessary to complete the course:

Notes:

Past grade distribution
Total number of evaluated students: 2

A	B	C	D	E	FX
0,0	50,0	0,0	50,0	0,0	0,0

Lecturers: doc. RNDr. Dana Pardubská, CSc., doc. RNDr. Ján Mazák, PhD.

Last change: 23.06.2022

Approved by: doc. RNDr. Pavel Chalmovianský, PhD.

COURSE DESCRIPTION

Academic year: 2025/2026

University: Comenius University Bratislava

Faculty: Faculty of Mathematics, Physics and Informatics

Course ID:	**Course title:**
FMFI.KMANM/2-MPG-113/15	Approximation and Interpolation Theory

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:
Preliminary assessment: continuous assessment 4x individual tasks 10 point each, tests 50%
Final assessment: oral examination 10%
Indicative assessment scale: A 90%; B 80%; C 70%; D 60%; E 50%
Scale of assessment (preliminary/final): 90/10

Learning outcomes:
The students obtain an overview of the results used in approximations and interpolations of functions of one real variable.

Class syllabus:
Polynomial functions and trigonometric polynomial functions. The Bernstein operator, the Bezier representation (the polar form of a polynomial). The Weierstrass theorem. The Lagrange interpolator. Jackson and Whitney's theorems. The spline approximation for functions of one variable. B-splines, polar forms. Advantages of the spline approximation.

Recommended literature:
Teorie aproximací / N. I. Achijezer. Praha : Nakladatelství Československé akademie věd, 1955
Aproximacia funkcií / Arnold Dávid, Ľudomír Šlahor. Bratislava : Univerzita Komenského, 1978
Aproximačné a kvadratúrne metódy / Adela Fillová, Anna Valková. Bratislava : MFF UK, 1986
Electronics materials of the lecturer published on the web page of the course.

Languages necessary to complete the course:
Slovak and English

Notes:

Past grade distribution
Total number of evaluated students: 0

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

Lecturers: Mgr. Jela Babušíková, PhD.
Last change: 21.06.2022
Approved by: doc. RNDr. Pavel Chalmovianský, PhD.

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: doc. RNDr. Pavel Chalmovianský, PhD.

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-150/15	CAD Systems

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

Number of credits: 3

Recommended semester: 2.

Educational level: II.

Prerequisites:

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

Learning outcomes:
Students will get familiar with free CAD applications QCAD, SketchUp, Sweet Home 3D and FreeCAD. They will learn to create technical 2D drawings, model more complex 3D objects and use their own and publicly available 3D models when designing the interior of a house or apartment.

Class syllabus:
1. Drawing basic shapes (lines, rectangles, arcs, polygons) in QCAD.
2. Dimensioning, hatching, creating blocks and manipulating blocks, working with layers.
3. Advanced QCAD functions - trimming, smooth arc joining, working with text, editing dimension marks, and more.
4. Basics of working in SketchUp. Description of the application layout and settings (toolbar layout). Using push, move and rotate tools to create simple 3D objects.
5. Using other SketchUp tools to create more complex 3D models.
6. Overview of some interesting SketchUp extensions for creating complex objects. Create simple animations and create a virtual tours.
7. Basics of working in Sweet Home 3D. Creating walls, rooms, adding and placing windows and doors and furniture; setting materials, resizing of models.
8. Sweet Home 3D Extensions. Creating sloping walls and multi-storey buildings, work with lights, importing your own textures and new objects.
9. Basics of working in FreeCAD. Layout description, creation of simple objects.

Recommended literature:
Jiří Špaček, Michal Spielmann: AutoCAD – Názorný průvodce pro verze 2019 a 2020, Computer Press, 2020
Lydia Cline: SketchUp for Interior Design. John Wiley & Sons, 2014

Aidan Chopra: SketchUp For Dummies. John Wiley & Sons, 2020
Tutorial Books: FreeCAD 0.19 Learn by doing: Sketcher, Part Design, Assemblies, Technical Drawings Paperback. 2021
Róbert Bohdal: CAD systémy, https://flurry.dg.fmph.uniba.sk/webog/sk/bohdal-vyucba/52-bohdal/85-cad-systemy, 2020

Languages necessary to complete the course:
Slovak and English

Notes:

Past grade distribution
Total number of evaluated students: 29

A	B	C	D	E	FX
79,31	17,24	0,0	0,0	3,45	0,0

Lecturers: RNDr. Róbert Bohdal, PhD.

Last change: 24.06.2022

Approved by: doc. RNDr. Pavel Chalmovianský, PhD.

COURSE DESCRIPTION

Academic year: 2025/2026

University: Comenius University Bratislava

Faculty: Faculty of Mathematics, Physics and Informatics

Course ID:	**Course title:**
FMFI.KAI/2-MPG-246/15	Colour Image Processing

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: 4.

Educational level: II.

Prerequisites:

Course requirements:
It is necessary to obtain at least 90% of the points to obtain A grade, at least 80% of points to grade B, at least 70% of points to grade C, at least 60% to grade D and at least 50% to grade E.
The course assessment consists of three parts: exercises (25%), project (25%) and final exam (50%). Students should get at least 30 points (out of 50) from exercises and project to meet the minimum condition for admission to the final written exam.
Scale of assessment (preliminary/final): 50/50

Learning outcomes:
After completing the subject, the student will master advanced techniques of the colour-image processing.

Class syllabus:
• Color science (human visual system, colorimetry)
• Color models, color quantization, and palette determination.
• Color morphology.
• Edge search (multi-dimensional gradient, vector order statistics)
• Color image filtering (debluring, defocusing, Fast Filtering)
• Color image segmentation and editing (GMM, graph cut, grab cut)
• Convert a color image to grayscale and vice versa
• Color fastness for one (white patch retinex, gray world assumption) and multiple light sources
• Highlights
• Color space mapping
• Multisprectral image acquisition and processing (IR and UV images)

Recommended literature:
• Image processing, analysis, and machine vision / Milan Sonka, Vaclav Hlavac, Roger Boyle. [Stamford] : Cengage Learning, 2008
• Digital image processing / Rafael C. Gonzalez, Richard E. Woods. Beijing : PEARSON; 4th edition, 2018

• Computer Vision: Algorithms and Applications, Richard Szeliski, The University of Washington, 2nd ed. 2021
• Color in computer vision : Fundamentals and applications / Theo Gevers ... [et al.]. Hoboken : Wiley, 2012
• Digital color image processing / Andreas Koschan, Mongi Abidi. Hoboken, N.J. : Wiley, 2008

Languages necessary to complete the course:
Slovak and English

Notes:

Past grade distribution
Total number of evaluated students: 8

A	B	C	D	E	FX
0,0	37,5	50,0	12,5	0,0	0,0

Lecturers: doc. RNDr. Zuzana Černeková, PhD.

Last change: 23.06.2022

Approved by: doc. RNDr. Pavel Chalmovianský, PhD.

COURSE DESCRIPTION

Academic year: 2025/2026

University: Comenius University Bratislava

Faculty: Faculty of Mathematics, Physics and Informatics

Course ID:	**Course title:**
FMFI.KI/2-MPG-218/22	Computational Complexity

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: 5

Recommended semester: 4.

Educational level: II.

Prerequisites:

Course requirements:
Assessment: evaluation
Preliminary assessment: Continuous assessment, individual work, paper. For attending the final examination, the student should have at least 50% of the points from the continuous assessment.
Final assessment: 50% Final evaluation examination (written, oral)
Scale of assessment (preliminary/final): 50/50

Learning outcomes:
The students acquire a basic knowledge of complexity theory. They will know basic models and their relation to the characterization of complexity of real problems, with emphasis on hard problems. They will grasp the methods used to analyse and solve hard algorithmic problems and they will be able to apply them.

Class syllabus:
- Problems and algorithms. Basic computational models and complexity measures.
- Complexity classes, their fundamental characteristics and hierarchies.
- Reduction and completness in the complexity classes. NP-complete problems.
- Methods of solving (computationally) hard problems – deterministic methods, heuristics, approximation algorithms, probabilistic algorithms.

Recommended literature:
Zložitosť geometrických algoritmov / Pavel Chalmovianský, Andrej Ferko, Roman Galbavý. Bratislava : Univerzita Komenského, 2001
Algorithmics for hard problems : Introduction to combinatorial optimization, randomization, approximation, and heuristics / Juraj Hromkovič. Berlin : Springer, 2003
Approximation algorithms / Vijay V. Vazirani. Berlin : Springer, 2001

Languages necessary to complete the course:
Slovak and English

Notes:

Past grade distribution
Total number of evaluated students: 0

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

Lecturers: doc. RNDr. Dana Pardubská, CSc.

Last change: 23.06.2022

Approved by: doc. RNDr. Pavel Chalmovianský, PhD.

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-203/00	Computational Geometry

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: 3.

Educational level: II.

Prerequisites:

Course requirements:
Homeworks (written solutions of problems and their consulting 40%), final exam (oral exam with written preparation 60%). Rough evaluation scale: A 90%, B 80%, C 70%, D 60%, E 50%
Scale of assessment (preliminary/final): 40/60

Learning outcomes:
To acquaint the students with basic problems of computational geometry and their effective solutions.

Class syllabus:
Basic data structures of computational geometry.
Geometric searching.
Constructions of convex hull of finite set of points and modifications.
Proximity problems. Triangulations.
Intersection of polygons and polyhedra.

Recommended literature:
Zložitosť geometrických algoritmov / Pavel Chalmovianský, Andrej Ferko, Roman Galbavý. Bratislava : Univerzita Komenského, 2001
Boissonnat, Jean-Daniel; Yvinec, Mariette Algorithmic geometry. Translated from the 1995 French original by Hervé Brönnimann. (English) Zbl 0917.68212 Cambridge: Cambridge University Press. xxii, 519 p.(1998).
Okabe, Atsuyuki Author Profile; Boots, Barry; Sugihara, Kokichi; Chiu, Sung Nok Spatial tessellations. Concepts and applications of Voronoi diagrams. With a foreword by D. G. Kendall. 2nd ed. (English) Zbl 0946.68144 Wiley Series in Probability and Mathematical Statistics. Applied Probability and Statistics. Chichester: Wiley. xii, 671 p. (2000).

Languages necessary to complete the course:
Slovak and English

Notes:

Past grade distribution Total number of evaluated students: 161					
A	B	C	D	E	FX
30,43	10,56	16,15	13,04	13,04	16,77
Lecturers: doc. RNDr. Pavel Chalmovianský, PhD.					
Last change: 22.06.2022					
Approved by: doc. RNDr. Pavel Chalmovianský, PhD.					

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-142/00	Computer Constructive Geometry

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

Learning outcomes:
To become familiar with methods of parallel and central projections. Algorithmic access to construction and description of geometric objects by methods of analytic geometry.

Class syllabus:
1. Fundamental principles of parallel projection, affine transformations, perspective afinity.
2. Hierarchy of methods of parallel projection – orthogonal (Monge, axonometry), oblique (basic, degenerative axonometry).
3. Analytic access to methods of parallel projection to display the surfaces (of revolution, helical surfaces, translational surfaces).
4. Central projection, linear perspective projection, principle of stereo images, analytic access to central projection.

Recommended literature:
Konštruktívna geometria pre technikov / Václav Medek, Jozef Zámožík. Bratislava : Alfa, 1978
Osobný počítač a geometria / Václav Medek, Jozef Zámožík. Bratislava : Alfa, 1991
Základy počítačovej grafiky / Jozef Zámožík, Edita Vranková, Mária Mišútová, Iveta Markechová,STU Bratislava,1999
Zobrazovací metódy I, II / Emil Kraemer, SPN Praha, 1991
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: 75

A	B	C	D	E	FX
41,33	18,67	28,0	6,67	4,0	1,33

Lecturers: RNDr. Barbora Pokorná, PhD.

Last change: 18.03.2022

Approved by: doc. RNDr. Pavel Chalmovianský, PhD.

STATE EXAM DESCRIPTION

Academic year: 2025/2026	
University: Comenius University Bratislava	
Faculty: Faculty of Mathematics, Physics and Informatics	
Course ID: FMFI.KAG/2-MPG-952/15	**Course title:** Computer Graphics
Number of credits: 6	
Educational level: II.	
Course requirements: Assessment: State Examination Preliminary assessment: 0% Final assessment: 100% A 90%, B 80%, C 70%, D 60%, E 50% Scale of assessment (preliminary/final): 100/0	
Learning outcomes: The students demonstrate their ability to deal effectively with the facts and methods of geometrically oriented subjects of their study. The expected result is that the student passes the final state-exam in the subject of Computer Graphics.	
Class syllabus: Topics of the examination are taken from the following subjects: Computer Graphics (1), (2), (3); Computer Vision; Algorithms and Data Structures; Procedural Modelling; Image Processing and Encoding; Virtual and Extended Reality; Complexity Theory. The students answer questions from the subjects that they have completed.	
State exam syllabus:	
Languages necessary to complete the course: Slovak and English	
Last change: 03.09.2015	
Approved by: doc. RNDr. Pavel Chalmovianský, PhD.	

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-101/00	Computer Graphics (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:
For the semester, the student can get 50% for exercises and 50% for the final exam. To successfully pass the final exam, the student must obtain at least half of the points for the exercises. The final exam is written (50% of rating) and oral (50% of rating), continuous assessment is in the form of projects and homework.
Evaluation: A (100-91), B (90-81), C (80-71), D (70-61), E (60-51), Fx (50-0).

Learning outcomes:
Students will gain knowledge about algorithmic solutions to basic computer graphics problems. They will learn the principles of working on the creation of simple graphics applications using computer graphics algorithms. They will be able to evaluate them in terms of efficiency, time and memory requirements.

Class syllabus:
1. Affine transformations in 2D and 3D space.
2. Representation and modeling of 3D objects.
3. Determining the visible surface of objects in a 3D scene.
4. Projection from 3D to 2D space.
5. Calculation of intersection of basic objects.
6. Clipping basic primitives with respect to window, convex and non-convex shapes.
7. Rasterization of lines and selected quadratic curves, filling of raster shapes.
8. Antialiasing methods in 2D discrete space, supersampling and image filtering.
9. Phases of the imaging process (3D graphics channel).

Recommended literature:
Eugen Ružický, Andrej Ferko: Počítačová grafika a spracovanie obrazu, Bratislava: Sapientia, 1995
Jiří Žára a kol.: Moderní počítačová grafika, Computer Press, 2004
Allan Watt: 3D computer graphics (3rd edition), Addison Wesley, 1999
Philip Schneider, David Eberly: Geometric Tools for Computer Graphics, Morgan Kaufmann, 2003

Donald Hearn, Pauline Baker, Warren Carithers: Computer Graphics with Open GL (4th Edition), Pearson, 2010
Steve Marschner, Peter Shirley: Fundamentals of Computer Graphics (5th Edition), A K Peters/ CRC Press 2021

Languages necessary to complete the course:
Slovak and English

Notes:

Past grade distribution
Total number of evaluated students: 599

A	B	C	D	E	FX
15,03	13,36	16,36	20,53	21,7	13,02

Lecturers: RNDr. Martina Bátorová, PhD., RNDr. Róbert Bohdal, PhD.

Last change: 24.06.2022

Approved by: doc. RNDr. Pavel Chalmovianský, PhD.

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-102/00	Computer Graphics (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: FMFI.KAG/2-MPG-101/00 - Computer Graphics (1)

Course requirements:
For the semester, the student can get 40% for exercises and 60% for the final exam. To successfully pass the final exam, the student must obtain at least half of the points for the exercises. The final exam is only oral, continuous assessment is in the form of projects and homework.
Evaluation: A (100-91), B (90-81), C (80-71), D (70-61), E (60-51), Fx (50-0).

Learning outcomes:
Students will gain the necessary theoretical foundations and the ability to work with basic and advanced techniques of photorealistic computer graphics in 3D.

Class syllabus:
1. Spherical coordinates and direction (vector) in 3D, basic concepts of radiometry and photometry.
2. Interaction of light with the surface, BRDF definition, reflection equation, reflectance.
3. BRDF models, empirical models, physically based models, models based on measured data.
4. Shading methods, Gouraud, Phong and Blinn-Phong illumination model.
5. Ray casting, ray tracing, forward vs backward tracing, CSG and ray tracing.
6. Intersection of ray with parametric and algebraic surfaces.
7. Acceleration methods for ray tracing - bounding objects/volumes.
8. Acceleration methods for ray tracing - dividing the scene space.
9. Distributed ray tracing.
10. Monte Carlo integration and the reflection equation, integral estimation (estimator).
11. Monte Carlo integration and sampling, samples generation methods.
12. Multiple importance sampling and combined estimator.
13. Rendering equation, global vs local illumination.
14. Path tracing and bidirectional path tracing.
15. From rendering equation to radiosity, form-factor calculation.
16. Textures, texture mapping, texture filtering, procedural textures.
17. Shadows, shadows calculation methods.

Recommended literature:

Eugen Ružický, Andrej Ferko: Počítačová grafika a spracovanie obrazu, Bratislava: Sapientia, 1995
Jiří Žára a kol.: Moderní počítačová grafika (2. vydání), Computer Press, 2004
Samuel Buss: 3-D Computer Graphics - A Mathematical Introduction with OpenGL. Cambridge University Press, 2003
John Hughes, Andries van Dam, et al: Computer Graphics: Principles and Practice. Addison-Wesley, 2013
Tomas Akenine-Möller, Eric Haines, et al: Real-Time Rendering (4th Edition), A K Peters, 2018
Matt Pharr, Wenzel Jakob, Greg Humphreys: Physically Based Rendering: From Theory to Implementation (3rd Edition). Morgan Kaufmann, 2016
Steve Marschner, Peter Shirley: Fundamentals of Computer Graphics (5th Edition), A K Peters/ CRC Press 2021

Languages necessary to complete the course:
Slovak and English

Notes:

Past grade distribution
Total number of evaluated students: 286

A	B	C	D	E	FX
16,43	19,93	23,08	17,13	16,08	7,34

Lecturers: RNDr. Róbert Bohdal, PhD.

Last change: 24.06.2022

Approved by: doc. RNDr. Pavel Chalmovianský, PhD.

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-201/15	Computer Graphics (3)

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

Number of credits: 4

Recommended semester: 3.

Educational level: II.

Prerequisites:

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

Learning outcomes:
Advanced modeling and rendering methods and their applications to multidimensional data presentations.

Class syllabus:
ISO standardization and extensions for virtual and augmented reality (Bimber-Raskar). Computer game or mobile application design, modeling, interaction, and usability evaluation. Real-time rendering issues.
Computer animation (Szirmay-Kalos). Animation languages and procedural animation. Animating articulated structures: forward and inverse kinematics. Key-frame animation.
Geometry processing, special triangulations and levels of detail.
Textures for rendering, object movies and cultural heritage digitization. Visualizing of multidimensional data.

Recommended literature:
Szirmay-Kalos, L. Theory of 3D Computer Graphics. Akademiai Kiado 1995. PDF online at http://sirkan.iit.bme.hu/~szirmay/book.html
Fundamentals of interactive computer graphics / James D. Foley, Andries van Dam. Reading : Addison-Wesley, 1983 (Third edition by Hughes et al. 2013.CG Principles and Practice.)
Spatial Augmented Reality - Merging Real and Virtual Worlds / Bimber O., Raskar R. , A K Peters, 2005, PDF online at the class web page.
Počítačová grafika a spracovanie obrazu / Eugen Ružický, Andrej Ferko. Bratislava : Sapientia, 1995

Moderní počítačová grafika / Jiří Žára, Bedřich Beneš, Petr Felkel. Praha : Computer Press, 1998
Digital study materials by the lecturer, published online at the class web page.

Languages necessary to complete the course:
Slovak and English

Notes:

Past grade distribution
Total number of evaluated students: 38

A	B	C	D	E	FX
52,63	23,68	21,05	0,0	0,0	2,63

Lecturers: RNDr. Róbert Bohdal, PhD., doc. RNDr. Andrej Ferko, PhD., Mgr. Adriana Malovec Bosáková, PhD.

Last change: 22.06.2022

Approved by: doc. RNDr. Pavel Chalmovianský, PhD.

COURSE DESCRIPTION

Academic year: 2025/2026

University: Comenius University Bratislava

Faculty: Faculty of Mathematics, Physics and Informatics

Course ID:	**Course title:**
FMFI.KAI/2-AIN-222/00	Computer Graphics Aplications

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
A 92%, B 84%, C 76%, D 68%, E 60
Scale of assessment (preliminary/final): 100/0

Learning outcomes:
Students will have knowledge of successful design projects and new trends in the application of methods and means of computer graphics.

Class syllabus:
1. Project presentations according to the project report distributed to the students
2. Projects and results done at the department
3. New trends and applications of computer graphics techniques.

Recommended literature:
J. Žára, B. Beneš, P. Felkel, Moderní počítačová grafika, Computer Press, Praha 1998
Project report from journal IEEE Computer and Graphics Applications
http://www.computer.org/portal/web/computingnow/cga
Internet

Languages necessary to complete the course:
Slovak, English

Notes:

Past grade distribution
Total number of evaluated students: 189

A	B	C	D	E	FX
50,79	13,76	16,93	7,41	6,35	4,76

Lecturers: prof. RNDr. Roman Ďurikovič, PhD.

Last change: 18.11.2021

Approved by: doc. RNDr. Pavel Chalmovianský, PhD.

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-125/22	Computer Vision

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.

Prerequisites:

Antirequisites: FMFI.KAI/2-AIN-147/19

Course requirements:
Preliminary assessment: Homework programming exercises - 40% of the final grade.
Final assessment: Written and oral examination - 60% of the final grade.
Student needs at least half of points from homework projects to be able to attend the final exam.
Indicative assessment scale: A 90%, B 80%, C 70%, D 60%, E 50%
Scale of assessment (preliminary/final): 40% exercises/60 final exam

Learning outcomes:
Graduates will know the advance techniques of machine vision and image processing, their mathematical background and geometric techniques for 3D reconstruction

Class syllabus:
Fourier transformation, feature points, edge filters, mathematical morphology, segmentation, finite projective camera model, epipolar geometry, projective and metric reconstruction

Recommended literature:
Szeliski, R.: Computer Vision: Algorithms and Applications, 2010 (on-line)
Šikudová E., et al.:Počítačové videnie. Detekcia a rozpoznávanie objektov., Wikina
Reinhard Klette: Concise Computer Vision: An Introduction into Theory and Algorithms, Springer-Verlag London 2014
R. Hartley, A. Zisserman: Multiple View Geometry in Computer Vision, 2nd Edition, Cambridge University Press 2004
Electronic study materials

Languages necessary to complete the course:
Slovak and English

Notes:

Past grade distribution
Total number of evaluated students: 4

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

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

Last change: 22.06.2022

Approved by: doc. RNDr. Pavel Chalmovianský, PhD.

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-167/22	Data Compresion

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

Learning outcomes:
The students will master the fundamentals of the data compression for static and dynamic images.

Class syllabus:
Lossless coding: the Huffman coding, the Huffman shift coding, the Ziv – Lempel – Welch coding, Run – length encoding, bit plane coding (PDQ, DDC).
Arithmetic coding. Data compression using prediction. Block coding (BTC, IBTC), vector quantization (VQ), sub-band coding. Transform coding: discrete orthogonal transforms: Karhunen – Loeve transformation, SVD transformation, data approximation using functions of discrete orthogonal transforms, zonal filtering, JPEG, combined transform coding (CTC). Wavelet transforms and their use in transform coding of images. Image segmentation: coding with non-rectangular blocks. Hybrid coding: intra-picture and inter-picture – compression of moving images, motion vector. Video compression standards. Digital television.

Recommended literature:
Vybrané metódy kompresie dát : Kódovanie obrazov / Jaroslav Polec, Tatiana Karlubíková, Miloš Oravec a kol.. Bratislava : Fakulta matematiky, fyziky a informatiky UK, 2000
Polec, Jaroslav - Pavlovičová, Jarmila - Karlubíková, Tatiana: Medzinárodné štandardy pre kompresiu obrazu II : H.261, MPEG-1, MPEG-2, H.263, MPEG-4. - Bratislava : FEI STU, 2002. - 151 s. - ISBN 80-227-1784-3

Languages necessary to complete the course:
Slovak and English

Notes:

Past grade distribution
Total number of evaluated students: 0

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

Lecturers: prof. Ing. Jaroslav Polec, PhD.

Last change: 06.12.2021

Approved by: doc. RNDr. Pavel Chalmovianský, PhD.

COURSE DESCRIPTION

Academic year: 2025/2026

University: Comenius University Bratislava

Faculty: Faculty of Mathematics, Physics and Informatics

Course ID:	**Course title:**
FMFI.KAI/2-AIN-226/22	Deep Learning for Computer Vision

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: 1., 3.

Educational level: II.

Prerequisites:

Course requirements:
Continuous assessment: homework, project
Examination: oral examination
Indicative assessment scale: A 90%, B 80%, C 70%, D 60%, E 50%
Scale of assessment (preliminary/final): 60/40

Learning outcomes:
Upon completion the student will have a good understanding of the theoretical background of various types of neural networks used in computer vision for classification, localization and object detection tasks as well as generative models. The student will also be able to create, implement, train and evaluate such networks with the use of hardware on PCs or in the cloud.

Class syllabus:
Introduction - machine learning basics, classical approaches to feature extraction, data splits and model evaluation, image manipulation basics
Classification - k-nearest neighbors method, linear classifier, loss functions, gradient optimization, regularization
Fully-connected NNs - computational graphs, vectorized computation, backpropagation, loss functions, automatic differentiation software, augmentation, dropout, stochastic optimization
Convolutional NNs - convolution, pooling, vanishing gradients, batch normalization, weight initialization, transfer learning, architectures
Recurrent NNs - sequential data, hidden states, LSTM, GRU, training regimes
Transformers - self-attention, transformers in NLP tasks, combinations with CNNs, transformers in computer vision
Object detection and segmentation - one and two stage object detectors, expansion of object detectors to segmentation, segmentation architectures, data annotation
Generative models - GAN, VAE
CNN visualization and understanding - learned features, style transfer, deep dream, adversarial examples, activation maps

Scientific and ethical problems of computer vision - data collection, privacy issues, computational dominance, method interpretability, safety, undesirable social effects, model bias, illusion of algorithmic objectivity

Recommended literature:

Ian Goodfellow and Yoshua Bengio and Aaron Courville: Deep learning, MIT Press, Online for free, http://www.deeplearningbook.org/

Michael Nielsen: Neural networks and deep learning, Online for free, http://neuralnetworksanddeeplearning.com/

Adrian Rosebrock: Computer Vision and deep learning, Resource guide

Languages necessary to complete the course:

Slovak, English

Notes:

Past grade distribution

Total number of evaluated students: 27

A	B	C	D	E	FX
14,81	11,11	22,22	25,93	11,11	14,81

Lecturers: doc. RNDr. Zuzana Černeková, PhD., Ing. Viktor Kocur, PhD.

Last change: 18.11.2021

Approved by: doc. RNDr. Pavel Chalmovianský, PhD.

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: doc. RNDr. Pavel Chalmovianský, PhD.					

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-117/22	Differential geometry and its applications

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: 5

Recommended semester: 2.

Educational level: II.

Prerequisites:

Course requirements:
Homeworks (written solutions of problems and their consulting 60%), final exam (oral exam with written preparation 40%). Rough evaluation scale: A 90%, B 80%, C 70%, D 60%, E 50%
Scale of assessment (preliminary/final): 60/40

Learning outcomes:
The student masters basic techniques of approximation of curves, surfaces and its differential-geometric characteristics, their local of global optimization applied on areas of geometric processing.

Class syllabus:
Basic notions of Lie group, bundle theory on varieties, spherical and hyperbolic geometries. The notions are illustrated on examples and applications in the are of geometry processing and visualization. As topics serve canal surfaces, minimum surfaces, hull surfaces and further constructions of curves and surfaces in Euclidean, elliptic and hyperbolic type of spaces.

Recommended literature:
1. Gary R. Jensen, Emilio Musso, Lorenzo Nicolodi: Surfaces in Classical Geometries, Springer 2016
2. Marcel Berger, Bernard Gostiaux: Differential Geometry: Manifolds, Curves, and Surfaces, Springer, GTM 115, 1988
3. Philipp Grohs, Martin Holler, Andreas Weinmann: Handbook of Variational Methods for Nonlinear Geometric Data, Springer, 2020
4. Tristan Needham: Visual Differential Geometry and Forms, Princeton University Press, 2021
5. Web materials created by the lecturer

Languages necessary to complete the course:
English

Notes:

Past grade distribution
Total number of evaluated students: 3

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

Lecturers: doc. RNDr. Pavel Chalmovianský, PhD.

Last change: 22.06.2022

Approved by: doc. RNDr. Pavel Chalmovianský, PhD.

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-245/00	Digital and Computational Photography

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:

Learning outcomes:
Introduce the processes in digital photography from the artistic and technical point of view, then extend the subject with the computational photography state-of-the-art.

Class syllabus:
: Camera and optics, light sources, special capturing devices, ideal pinhole camera. Calibration, suppressing image distortions due to optics. Omnidirectional sensing, stitching and panoramas. Visual perception, creative photography, image exposition and composition. Editing of digital photography, digital effects in artistic photography. Simple and multiple view photogrammetry. Generalized sensor/optics, ray processing. Image morphing/warping, HDR (high dynamic range), image based illumination. Texture synthesis, matting. Selected parts from the theory of image processing. Refocusing, deblurring, depth detection using flash. Synthetic aperture, confocal imaging, bracketing, time-lapse photography and image fusion.

Recommended literature:
Fundamentals of interactive computer graphics / James D. Foley, Andries van Dam. Reading : Addison-Wesley, 1983
Spatial Augmented Reality - Merging Real and Virtual Worlds / Bimber O., Raskar R. , A K Peters, 2005, PDF online na predmetovej stránke.
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: 51

A	B	C	D	E	FX
68,63	9,8	5,88	3,92	11,76	0,0

Lecturers: prof. Ing. Jaroslav Polec, PhD.
Last change: 02.09.2015
Approved by: doc. RNDr. Pavel Chalmovianský, PhD.

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-910/00	Diploma Thesis (1)

Educational activities:
Type of activities: independent work
Number of hours:
per week: 6 **per level/semester:** 78
Form of the course: on-site learning

Number of credits: 6

Recommended semester: 3.

Educational level: II.

Prerequisites:

Course requirements:

Learning outcomes:

Class syllabus:
Problem specification and its analysis.
Overview of the given area.
Methodics of problem solving.
Project decision.
Plan of the work and its checking.
Software realization.
Numerical experiments.
Structure of diploma thesis text.

Recommended literature:
According to specifications of diploma thesis tutor.

Languages necessary to complete the course:
Slovak and English

Notes:

Past grade distribution
Total number of evaluated students: 147

A	B	C	D	E	FX
44,22	12,93	16,33	6,8	10,2	9,52

Lecturers: doc. RNDr. Pavel Chalmovianský, PhD., doc. RNDr. Andrej Ferko, PhD.

Last change: 02.09.2015

Approved by: doc. RNDr. Pavel Chalmovianský, PhD.

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-911/00	Diploma Thesis (2)

Educational activities:
Type of activities: independent work
Number of hours:
per week: 10 **per level/semester:** 130
Form of the course: on-site learning

Number of credits: 10

Recommended semester: 4.

Educational level: II.

Prerequisites:

Course requirements:

Learning outcomes:

Class syllabus:
Diploma thesis text writing.

Recommended literature:
According to specifications of diploma thesis tutor.

Languages necessary to complete the course:
Slovak and English

Notes:

Past grade distribution
Total number of evaluated students: 133

A	B	C	D	E	FX
60,9	8,27	13,53	3,76	10,53	3,01

Lecturers: doc. RNDr. Pavel Chalmovianský, PhD., doc. RNDr. Andrej Ferko, PhD.

Last change: 02.09.2015

Approved by: doc. RNDr. Pavel Chalmovianský, PhD.

STATE EXAM DESCRIPTION

Academic year: 2025/2026	
University: Comenius University Bratislava	
Faculty: Faculty of Mathematics, Physics and Informatics	
Course ID: FMFI.KAG/2-MPG-991/15	**Course title:** Diploma Thesis Defense
Number of credits: 4	
Educational level: II.	
Course requirements: Assessment: State Examination - Thesis Defence Preliminary assessment: 0% Final assessment: 100% Scale of assessment (preliminary/final): 100/0	
Learning outcomes: The students write, submit and defend their diploma theses, and thus gain several competences specified in the graduate's characteristic in this study programme.	
Class syllabus: Individual work by the student, under the guidance of the diploma thesis supervisor. Writing and submitting a diploma thesis. Defense of the diploma thesis.	
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 and English	
Last change: 03.09.2015	
Approved by: doc. RNDr. Pavel Chalmovianský, PhD.	

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-920/00	Diploma Thesis Seminar (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: 2

Recommended semester: 2.

Educational level: II.

Prerequisites:

Course requirements:
Assessment: evaluation
Interim evaluation: presentations and discussion.
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 interim / final evaluation: Interim evaluation 100%.

Learning outcomes:
Obtain and train professional skills and experience for individual and cooperative research work for medium size projects.

Class syllabus:
An overview on technology of scientific methodology and research work on medium size projects.
Scientific writing. Requirements and conventions.
Student presentations of their diploma projects and work in progress.

Recommended literature:
According to requirements of thesis advisor.
Fundamentals of interactive computer graphics / James D. Foley, Andries van Dam. Reading : Addison-Wesley, 1983
Curves and Surfaces for computer-Aided geometric design : A practical Guide / Gerald E. Farin. San Diego : Academic Press, 1997
Počítačová grafika a spracovanie obrazu / Eugen Ružický, Andrej Ferko. Bratislava : Sapientia, 1995
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 and English

Notes:

Past grade distribution Total number of evaluated students: 158					
A	B	C	D	E	FX
74,68	0,63	8,23	0,0	13,92	2,53
Lecturers: doc. RNDr. Andrej Ferko, PhD.					
Last change: 22.06.2022					
Approved by: doc. RNDr. Pavel Chalmovianský, PhD.					

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-921/00	Diploma Thesis Seminar (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: 2

Recommended semester: 3.

Educational level: II.

Prerequisites:

Course requirements:
Assessment: evaluation
Preliminary assessment: 100% Continuous asessment, oral and WWW presentations
Final assessment: 0% Final evaluation exam
A 90%, B 80%, C 70%, D 60%, E 50%
Scale of assessment (preliminary/final): 100/0

Learning outcomes:
Obtain and train professional skills and experience for individual and cooperative research work for large size projects.

Class syllabus:
Student presentations of their diploma projects and work in progress.

Recommended literature:
According to requirements of thesis advisor.
According to requirements of thesis advisors.
Zložitosť geometrických algoritmov / Pavel Chalmovianský, Andrej Ferko, Roman Galbavý. Bratislava : Univerzita Komenského, 2001
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
Master's thesis relevant selection of recent research papers.

Languages necessary to complete the course:
Slovak and English

Notes:

Past grade distribution Total number of evaluated students: 153					
A	B	C	D	E	FX
70,59	3,27	13,07	0,0	3,27	9,8
Lecturers: doc. RNDr. Andrej Ferko, PhD., doc. RNDr. Pavel Chalmovianský, PhD.					
Last change: 03.09.2015					
Approved by: doc. RNDr. Pavel Chalmovianský, PhD.					

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: doc. RNDr. Pavel Chalmovianský, PhD.

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: doc. RNDr. Pavel Chalmovianský, PhD.

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: doc. RNDr. Pavel Chalmovianský, PhD.

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: doc. RNDr. Pavel Chalmovianský, PhD.

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-149/00	Fractal Modelling

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:
Continuous assessment: tests, midterm and final. For the semester, the student can get 40% for the midterm, 60% for the final test. The student must obtain at least half of the points for both tests in order to pass the course.
Grading: A (100-91), B (90-81), C (80-71), D (70-61), E (60-51), Fx (50-0).

Learning outcomes:
Overview of fractal geometry and its applications in computer graphics.

Class syllabus:
Mathematical background. Deterministic fractals (Koch, Peano, Sierpiński). IFS (iterated functions system, attractors, chaos game). Fractal compression. L-systems (modeling of plants, trees,…). Julia sets, Mandelbrot set, Newton fractals. Strange attractors (dynamical systems).

Recommended literature:
Peitgen, H.-O., Saupe D.: The Science of Fractal Images, Springer Verlag
Benoit B. Mandelbrot: The Fractal Geometry of Nature, W. H. Freeman
Fractals everywhere / Michael F. Barnsley. San Francisco : Morgan Kaufmann, 1993
Digital study materials by the lecturer, published online at the class web page.

Languages necessary to complete the course:
Slovak and English

Notes:

Past grade distribution
Total number of evaluated students: 90

A	B	C	D	E	FX
33,33	15,56	13,33	13,33	24,44	0,0

Lecturers: doc. RNDr. Andrej Ferko, PhD.

Last change: 22.06.2022

Approved by: doc. RNDr. Pavel Chalmovianský, PhD.

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: doc. RNDr. Pavel Chalmovianský, PhD.

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: doc. RNDr. Pavel Chalmovianský, PhD.

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: doc. RNDr. Pavel Chalmovianský, PhD.

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: doc. RNDr. Pavel Chalmovianský, PhD.

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-116/22	General 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: 1.

Educational level: II.

Prerequisites:

Course requirements:
Preliminary assessment: 0% Final assessment: Final evaluation exam 100% (A 90%; B 80%; C 70%; D 60%; E 50%)
Scale of assessment (preliminary/final): Final evaluation exam 100% (A 90%; B 80%; C 70%; D 60%; E 50%)

Learning outcomes:
The student masters basic constructions and fundamental facts from set-theoretic topology for nonspecialists.

Class syllabus:
Metric topology. Topological spaces. Continuous mappins. Basic constructions of topological spaces. Countability axioms. Separation axioms (T1 – T4). Nets and convergence. Connectedness. Compactness. Topological manifolds and their discrete representations.

Recommended literature:
Engelking, Ryszard: General topology. Rev. and compl. ed. Sigma Series in Pure Mathematics, 6. Berlin: Heldermann Verlag. viii, 529 p. ,1989.
Ladislav Mišík: Funkcionálna analýza / . Bratislava : Alfa, 1989
Glen E. Bredon: Topology and geometry / . New York : Springer, 1993
Vlastné elektronické texty vyučujúceho predmetu zverejňované prostredníctvom web stránky predmetu.

Languages necessary to complete the course:
Slovak, English

Notes:

Past grade distribution
Total number of evaluated students: 3

A	B	C	D	E	FX
66,67	0,0	33,33	0,0	0,0	0,0

Lecturers: RNDr. Martin Sleziak, PhD., doc. RNDr. Pavel Chalmovianský, PhD.
Last change: 18.06.2022
Approved by: doc. RNDr. Pavel Chalmovianský, PhD.

STATE EXAM DESCRIPTION

Academic year: 2025/2026	
University: Comenius University Bratislava	
Faculty: Faculty of Mathematics, Physics and Informatics	
Course ID: FMFI.KAG/2-MPG-953/15	**Course title:** Geometric Modelling
Number of credits: 6	
Educational level: II.	
Course requirements: Assessment: State Examination Preliminary assessment: 0% Final assessment: 100% A 90%, B 80%, C 70%, D 60%, E 50% Scale of assessment (preliminary/final): 100/0	
Learning outcomes: The students demonstrate their ability to deal effectively with the facts and methods of geometrically oriented subjects of their study. The expected result is that the student passes the final state-exam in the subject of Geometric Modelling.	
Class syllabus: Topics of the examination are taken from the following subjects: Differential Geometry; Algebraic Geometry (1); Computational Geometry; Topology and Functional Analysis; Modelling of Curves and Surfaces (1), (2); Numerical Mathematics for Graphic Designers; Modelling of Curves and Surfaces (3), (4).	
State exam syllabus:	
Languages necessary to complete the course: Slovak and English	
Last change: 03.09.2015	
Approved by: doc. RNDr. Pavel Chalmovianský, PhD.	

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: doc. RNDr. Pavel Chalmovianský, PhD.

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: doc. RNDr. Pavel Chalmovianský, PhD.

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: doc. RNDr. Pavel Chalmovianský, PhD.

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: doc. RNDr. Pavel Chalmovianský, PhD.

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-112/22	Image Processing and Encoding

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

Learning outcomes:

Class syllabus:
Signals, systems and Discrete Fourier Transform. Z-transformation, impulse response, filters with finite and infinite impulse response. Discrete orthogonal transformations, PCA. Evaluation of the spectrum, correlation models of the image. Human visual system, color systems. Enhancement of the image: contrast, dynamic range, noise reduction, edge detection. Reconstruction of the image: homomorphic systems, reduction of additive noise, reduction of multiplicative noise. Spectral analysis, reduction of combined noises, reduction of noise depending on the signal. Image interpolation: median, mean, spline methods, convolution interpolation, polynomial interpolation, interpolation by the discrete orthogonal transformations. Image segmentation. Losless image encoding – the principle and basic methods. Lossy image encoding – the principle and basic methods. Some problems connected with the errors of the transmissed encoded image.

Recommended literature:
Kódovaní / Jiří Adámek. Praha : Státní nakladatelství technické literatury, 1989
Vybrané metódy kompresie dát : Kódovanie obrazov / Jaroslav Polec, Tatiana Karlubíková, Miloš Oravec a kol.. Bratislava : Fakulta matematiky, fyziky a informatiky UK, 2000
Digital image processing / Rafael C. Gonzalez, Richard E. Woods. Beijing : Pearson education Asia : Publishing House of Electronics Industry, 2010
Digital study materials by the lecturer, published online at the class web-page.

Languages necessary to complete the course:
Slovak and English

Notes:

Past grade distribution
Total number of evaluated students: 0

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

Lecturers: prof. Ing. Jaroslav Polec, PhD.

Last change: 06.12.2021

Approved by: doc. RNDr. Pavel Chalmovianský, PhD.

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: doc. RNDr. Pavel Chalmovianský, PhD.

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-115/10	Modelling of Curves and Surfaces (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:
Homeworks (written solutions of problems and their consulting 40%), final exam (oral exam with written preparation 60%). Rough evaluation scale: A 90%, B 80%, C 70%, D 60%, E 50%
Scale of assessment (preliminary/final): 40/60

Learning outcomes:
The students should know, theoretically and practically, basic principles and techniques of construction of piecewise polynomial/rational curves, their properties and some ways of modifications of such curves in computer aided geometric design.

Class syllabus:
Bézier curves. Polar forms of polynomial curves.
Simple interpolation schemes. Spline curves.
B-spline functions and curves, NURBS curves.
Selected subdivision curve schemes.

Recommended literature:
Fundamentals of computer aided geometric design / Josef Hoschek, Dieter Lasser ; translated by Larry L. Schumaker. Wellesley : A. K. Peters, 1993
Curves and Surfaces for computer-Aided geometric design : A practical Guide / Gerald E. Farin. San Diego : Academic Press, 1997
Cohen, Elaine; Riesenfeld, Richard F.; Elber, Gershon Geometric modeling with splines: an introduction. (English) Zbl 0980.65016 Natick, MA: A. K. Peters. xxii, 616 p. (2001).
The electronic materials of the teacher published via the web-page of the subject.

Languages necessary to complete the course:
Slovak and English

Notes:

Past grade distribution
Total number of evaluated students: 103

A	B	C	D	E	FX
36,89	8,74	17,48	11,65	4,85	20,39

Lecturers: doc. RNDr. Pavel Chalmovianský, PhD., RNDr. Barbora Pokorná, PhD., RNDr. Martina Bátorová, PhD.

Last change: 22.06.2022

Approved by: doc. RNDr. Pavel Chalmovianský, PhD.

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-215/10	Modelling of Curves and Surfaces (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:
Homeworks (written solutions of problems and their consulting 40%), final exam (oral exam with written preparation 60%). Rough evaluation scale: A 90%, B 80%, C 70%, D 60%, E 50%

Learning outcomes:
The students should know, theoretically and practically, basic principles and techniques of construction of piecewice polynomial/rational surfaces, their properties and some ways of modifications of such curves in computer aided geometric design.

Class syllabus:
Bézier quadrangular and triangular patches and their polar forms.
B-spline surfaces, NURBS-surfaces. Coons quadrangle and triangle interpolation surfaces.
Selected subdivision schems of surface constructions.

Recommended literature:
Fundamentals of computer aided geometric design / Josef Hoschek, Dieter Lasser ; translated by Larry L. Schumaker. Wellesley : A. K. Peters, 1993
Curves and Surfaces for computer-Aided geometric design : A practical Guide / Gerald E. Farin. San Diego : Academic Press, 1997
Cohen, Elaine; Riesenfeld, Richard F.; Elber, Gershon Geometric modeling with splines: an introduction. (English) Zbl 0980.65016 Natick, MA: A. K. Peters. xxii, 616 p. (2001).
The electronic materials of the teacher published via web of the subject.

Languages necessary to complete the course:
Slovak and English

Notes:

Past grade distribution
Total number of evaluated students: 111

A	B	C	D	E	FX
32,43	10,81	18,92	15,32	5,41	17,12

Lecturers: doc. RNDr. Pavel Chalmovianský, PhD., RNDr. Barbora Pokorná, PhD.
Last change: 22.06.2022
Approved by: doc. RNDr. Pavel Chalmovianský, PhD.

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-216/10	Modelling of Curves and Surfaces (3)

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

Number of credits: 3

Recommended semester: 3.

Educational level: II.

Prerequisites:

Course requirements:
Final exam (oral exam with written preparation 100%). Rough evaluation scale: A 90%, B 80%, C 70%, D 60%, E 50%

Learning outcomes:
The student gets more involved with topics of CAGD based on individual studium as well as lecturing of current monographic and scientific journal works and he approaches advanced techniques of geometric modeling. His final work is evaluated from professional as well as pedagogical point of view. The lectured topics and the topics of the evaluated exam are linked in extended context.

Class syllabus:
Forms of continuity of curves and surfaces. Necessary and suffiecient conditions of continuity of curves and surfaces. DMS splines. Geometry of meshes and refinement schemes.

Recommended literature:
Fundamentals of computer aided geometric design / Josef Hoschek, Dieter Lasser ; translated by Larry L. Schumaker. Wellesley : A. K. Peters, 1993
Wavelets for Computer Graphics: Theory and Applications. Eric J. Stollnitz, Tony D. DeRose, and David H. Salesin. Morgan Kaufmann, San Francisco, 1996.
Computing in Euclidean Geometry, Ding-Zhu Du,Frank Hwang, World Scientific, 1995, 492 strán
The electronic materials of the teacher published via web of the subject.

Languages necessary to complete the course:
Slovak and English

Notes:

Past grade distribution Total number of evaluated students: 35					
A	B	C	D	E	FX
74,29	8,57	5,71	2,86	0,0	8,57
Lecturers: doc. RNDr. Pavel Chalmovianský, PhD.					
Last change: 22.06.2022					
Approved by: doc. RNDr. Pavel Chalmovianský, PhD.					

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-217/10	Modelling of Curves and Surfaces (4)

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

Number of credits: 3

Recommended semester: 4.

Educational level: II.

Prerequisites:

Course requirements:
Final exam (oral exam with written preparation 100%). Rough evaluation scale: A 90%, B 80%, C 70%, D 60%, E 50%
Scale of assessment (preliminary/final): 0/100

Learning outcomes:
The student gets more involved with topics of CAGD based on individual studium as well as lecturing of current monographic and scientific journal works and he approaches advanced techniques of geometric modeling. His final work is evaluated from professional as well as pedagogical point of view. The lectured topics and the topics of the evaluated exam are linked in extended context.

Class syllabus:
Curves and surfaces constructed with refinement schemes. Wavelets. Modeling using implicitely defined curves and surfaces. Variational modeling of curves and surfaces. Selected numerical algorithms used for computing of curves and surfaces in CAGD.

Recommended literature:
Fundamentals of computer aided geometric design / Josef Hoschek, Dieter Lasser ; translated by Larry L. Schumaker. Wellesley : A. K. Peters, 1993
Wavelets for Computer Graphics: Theory and Applications. Eric J. Stollnitz, Tony D. DeRose, and David H. Salesin. Morgan Kaufmann, San Francisco, 1996.
Computing in Euclidean Geometry, Ding-Zhu Du,Frank Hwang, World Scientific, 1995, 492 strán
The electronic materials of the teacher published via web of the subject.

Languages necessary to complete the course:
Slovak and English

Notes:

Past grade distribution Total number of evaluated students: 8					
A	B	C	D	E	FX
75,0	12,5	12,5	0,0	0,0	0,0
Lecturers: doc. RNDr. Pavel Chalmovianský, PhD.					
Last change: 22.06.2022					
Approved by: doc. RNDr. Pavel Chalmovianský, PhD.					

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-161/12	Numerical Geometry Seminar (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: 2

Recommended semester: 1.

Educational level: II.

Prerequisites:

Course requirements:
Continuous assessment: active participation in seminars, presentations and discussion.
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 interim / final evaluation: Interim evaluation 100%.

Learning outcomes:
The graduate of the seminar in the given semester will master the latest published results of the participants and guests of the seminar as a specification of the methodology of scientific work.

Class syllabus:
The recent results of doctoral students and seminar guests are discussed.

Recommended literature:
Fundamentals of interactive computer graphics / James D. Foley, Andries van Dam. Reading : Addison-Wesley, 1983
Real-time rendering / Tomas Akenine-Möller, Eric Haines, Naty Hoffman. Wellesley : A. K. Peters, 2008
• Selection of recent papers in the field of research in geometric modeling, computer graphics and vision as well as selected applications.

Languages necessary to complete the course:
English and Slovak

Notes:

Past grade distribution
Total number of evaluated students: 7

A	B	C	D	E	FX
71,43	14,29	0,0	0,0	14,29	0,0

Lecturers: doc. RNDr. Andrej Ferko, PhD.

Last change: 22.06.2022
Approved by: doc. RNDr. Pavel Chalmovianský, PhD.

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-162/12	Numerical Geometry Seminar (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: 2

Recommended semester: 2.

Educational level: II.

Prerequisites:

Course requirements:
Continuous assessment: paper presentation, active participation in the seminar.
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 interim / final evaluation: Interim evaluation 100%.

Learning outcomes:
The graduate of the seminar in the given semester will master the latest published results of the participants and guests of the seminar as a specification of the methodology of scientific work. The seminar form will also enable him to achieve a recognizable position in the scientific debate on given topics.

Class syllabus:
The latest results of doctoral students and seminar guests are discussed.

Recommended literature:

Languages necessary to complete the course:
English and Slovak

Notes:

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. RNDr. Andrej Ferko, PhD.

Last change: 22.06.2022

Approved by: doc. RNDr. Pavel Chalmovianský, PhD.

COURSE DESCRIPTION

Academic year: 2025/2026

University: Comenius University Bratislava

Faculty: Faculty of Mathematics, Physics and Informatics

Course ID:	**Course title:**
FMFI.KMANM/2-MPG-243/22	Numerical Mathematics for Graphic Designers

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: 3

Recommended semester: 2.

Educational level: II.

Prerequisites:

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:
Students become familiar with methods and tools in numerical computing used in higher computer graphics (physical modeling and animation, global illumination problem, special modeling).

Class syllabus:
Computational model in numerical mathematics. Numerical stability and robustness, error analysis. Numerical solution of initial value and boundary values problems for ordinary differential equations, discretization methods, shooting method, variational approach – finite element method. Partial differential equations – the finite difference method for parabolic, hyperbolic and elliptic equations in 2D, explicit and implicit methods, stability, the alternating direction method. Applications of the numerical methods in physical and biological problems. Implementation numerical algorithms in Matlab.

Recommended literature:
Emil Vitásek : Numerické metody , SNTL, Praha, 1987
Golub, Ortega: Scientific Computing and Differential Euations – An Introduction to Numerical Methods, Academic Press, 1992
Holmes: Introduction to Numerical Methods in Differential Equations, Spriger, 2007
Burden, Faires: Numerical Analysis, 9th Edition, Cengage Learning, 2011

Languages necessary to complete the course:
Slovak and English

Notes:

Past grade distribution
Total number of evaluated students: 1

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

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

Last change: 21.06.2022

Approved by: doc. RNDr. Pavel Chalmovianský, PhD.

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-145/15	PC Graphics Devices Architecture

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:
For the semester, the student can get 100% for the final exam. The final exam is only oral.
Evaluation: A (100-91), B (90-81), C (80-71), D (70-61), E (60-51), Fx (50-0).
Scale of assessment (preliminary/final): 0/100

Learning outcomes:
After completing the course, students will know how some of the graphics peripherals of computers (2D and 3D monitors, touch screens and tablets, printers, graphics cards, etc.) work. Students will also familiarize themselves with the devices for augmented, virtual, and mixed reality.

Class syllabus:
1. Displaying devices (monitors and displays).
2. Devices displaying 3D images (stereoscopical and volume displays).
3. Projector technology (LCD, DLP, LCoS, ...).
4. Scanners – types and the principle of their operation.
5. Touch screens, digitizers and tablets.
6. Printers and plotters.
7. Input devices for computer graphics.
8. Devices for virtual reality (headup displays, haptic devices, treadmills).
9. Devices for augmented reality (smart glasses, projection see-through displays).
10. Position and motion sensors.
11. Graphics cards functions.
12. OpenGL, DirectX, SDL – API overview.

Recommended literature:
William Sherman, Alan Craig: Understanding Virtual Reality: Interface, Application, and Design, (2nd edition). Morgan Kaufmann, 2019
Robert Bohdal: Zariadenia pre rozšírenú a virtuálnu realitu. Knižničné a edičné centrum FMFI UK Bratislava, 2020
Róbert Bohdal: Architektúra grafických zariadení pre PC. https://flurry.dg.fmph.uniba.sk/webog/en/bohdal-vyucba/83-architektura.html, 2020

Languages necessary to complete the course:
Slovak and English

Notes:

Past grade distribution
Total number of evaluated students: 17

A	B	C	D	E	FX
35,29	52,94	5,88	5,88	0,0	0,0

Lecturers: RNDr. Róbert Bohdal, PhD.

Last change: 24.06.2022

Approved by: doc. RNDr. Pavel Chalmovianský, PhD.

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: doc. RNDr. Pavel Chalmovianský, PhD.

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: doc. RNDr. Pavel Chalmovianský, PhD.

COURSE DESCRIPTION

Academic year: 2025/2026

University: Comenius University Bratislava

Faculty: Faculty of Mathematics, Physics and Informatics

Course ID:	**Course title:**
FMFI.KAI/2-AIN-204/10	Pattern Recognition

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.

Prerequisites:

Course requirements:
tests, projects, oral exam
Scale: A 90%, B 80%, C 70%, D 60%, E 50%
Scale of assessment (preliminary/final): 40/60

Learning outcomes:
Graduates will acquire basic methods of classification.

Class syllabus:
The role of classification, feature articles and Syntax Notation.
Selection and pretreatment symptoms.
Classifiers, basic concepts.
Bayesian decision theory, discriminatory and divisive functions hypersurface, the criterion of the minimum error.
Decision trees.
Discriminant analysis, linear classifier.
Mechanisms of support vectors (SVM).
Neural networks.
Uncontrolled classifiers.
Hidden Markov models.
Quality rating classification.
Syntactic recognition, inference grammar. Special types of grammar.

Recommended literature:
Pattern classification / Richard O. Duda, Peter E. Hart, David G. Stork. New York : Wiley Interscience, 2001
Classification pattern recognition and reduction of dimensionality / edited by P. R. Krishnaiah, L. N. Kanal. Amsterdam : North-Holland, 1982
Modern multivariate statistical techniques : Regression, classification, and manifold learning / Alan Julian Izenman. New York : Springer, 2008

Languages necessary to complete the course:

Notes:

Past grade distribution
Total number of evaluated students: 182

A	B	C	D	E	FX
14,29	16,48	25,82	20,88	12,64	9,89

Lecturers: RNDr. Zuzana Berger Haladová, PhD.

Last change: 21.09.2018

Approved by: doc. RNDr. Pavel Chalmovianský, PhD.

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: doc. RNDr. Pavel Chalmovianský, PhD.

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: doc. RNDr. Pavel Chalmovianský, PhD.

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: doc. RNDr. Pavel Chalmovianský, PhD.

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: doc. RNDr. Pavel Chalmovianský, PhD.

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-211/15	Procedural Modelling

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:
For the semester, the student can get 100% for the final exam. The final exam is only oral.
Evaluation: A (100-91), B (90-81), C (80-71), D (70-61), E (60-51), Fx (50-0).
Scale of assessment (preliminary/final): 0/100

Learning outcomes:
After completing the course, students will know how to use the methods of procedural modeling for creating complex objects and large scenes using predefined functions or rules.

Class syllabus:
1. Generators of pseudorandom and random sequences.
2. Procedural creation of geometric objects.
3. Noises and turbulences.
4. Fractals and their procedural modeling.
5. Modeling of georelief, cities and facades.
6. Reaction diffusion, diffusion limited aggregation, biological mechanisms of exodermal pattern formation.
7. Cellular automata, demographic models and their use in simulations of various processes.
8. Procedural textures, projection of textures on 3D objects.
9. Particle systems.
10. Genetic and evolutionary algorithms.

Recommended literature:
Michael Barnsley: Fractals everywhere. Morgan Kaufmann, 1993
Benoit Mandelbrot: The Fractal Geometry of Nature. Echo Point Books & Media, 2021
David Ebert at al: Texturing and Modeling. A procedural approach (3rd edition). Morgan Kaufmann, 2002
Andrzej Katunin: A Concise Introduction to Hypercomplex Fractals. CRC Press, 2017
Tanya Short, Tarn Adams: Procedural Generation in Game Design. A K Peters/CRC Press, 2017

Languages necessary to complete the course:
Slovak and English

Notes:

Past grade distribution
Total number of evaluated students: 15

A	B	C	D	E	FX
60,0	20,0	20,0	0,0	0,0	0,0

Lecturers: RNDr. Róbert Bohdal, PhD.

Last change: 24.06.2022

Approved by: doc. RNDr. Pavel Chalmovianský, PhD.

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-141/00	Projective Geometry

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:

Learning outcomes:
The graduate learns the fundamentals of projective plane geometry, some consequences of the axioms of projective plane a understands the independence of Desargues's and Pappus's assertions with respect to these axioms. The graduate masters the Principle of duality in projective and also in Desarguesian and Pappian planes and is able to apply it. The graduate learns the synthetic definition and some properties of projective mappings and knows solutions of problems via synthetic and analytic methods.

Class syllabus:
n-dimensional projective space over a field, homogeneous coordinates. Subspaces, joins and intersections and their equations. Collineations. Cross ratio. Axioms of the projective plane and the projective space. Desarguesian and pappian planes. Coordinatization of a desarguesian plane. Finite projective and affine planes.

Recommended literature:
Projektívna geometria / Štefan Solčan. Bratislava : MFF UK, 1995
The real projective plane / Harold Scott MacDonald Coxeter. Toronto : McGraw-Hill book company, Inc., 1949
Foundations of Projective Geometry / Robin Hartshorne, New York: W. A. Benjamin, 1967, dostupne aj na http://filebox.vt.edu/users/jabrunso/Math/Hartshorne.pdf , marec 2014
Electronic texts of the lecturer published via the web-site of the course.
--- available also at http://filebox.vt.edu/users/jabrunso/Math/Hartshorne.pdf , March 2014

Languages necessary to complete the course:
Slovak and English

Notes:

Past grade distribution Total number of evaluated students: 84					
A	B	C	D	E	FX
57,14	28,57	8,33	4,76	1,19	0,0
Lecturers: doc. RNDr. Pavel Chalmovianský, PhD.					
Last change: 02.09.2015					
Approved by: doc. RNDr. Pavel Chalmovianský, PhD.					

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: doc. RNDr. Pavel Chalmovianský, PhD.

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: doc. RNDr. Pavel Chalmovianský, PhD.

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: doc. RNDr. Pavel Chalmovianský, PhD.

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: doc. RNDr. Pavel Chalmovianský, PhD.

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-205/00	Seminar in Computer Physics and Geometry

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

Number of credits: 2

Recommended semester: 4.

Educational level: II.

Prerequisites:

Course requirements:
Interim evaluation: papers, presentations and discussion.
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 interim / final evaluation: Interim evaluation 100%.

Learning outcomes:
In a seminar-talk, the student discusses a selected article containing the most recent results on modeling, simulation or visualization, mainly from the SIGGRAPH conference. The student gets also an overview on selected open problems in processing of visual information.

Class syllabus:
Introductory lectures on scientific methodology in general, and in geometry and graphics in particular (observation, experiment etc.).
The language of synthetic, analytic and iterative geometry, ruptures of the mathematics language (Kvasz), the Erlangen program, change of paradigm, Copernican revolution, Occam's razor, axiomatic method, algorithmic strategies, Raskar's hexagon, the role of errors, scientometry, open problems.Graphics in 2D and 3D, GUI, computational geometry, geometric modeling, computer vision, applications with scientific methodology. The seminar talks are about the most recent results , including talks at CESCG and Students' Scientific Conference.

Recommended literature:
Fundamentals of interactive computer graphics / James D. Foley, Andries van Dam. Reading : Addison-Wesley, 1983
Real-time rendering / Tomas Akenine-Möller, Eric Haines, Naty Hoffman. Wellesley : A. K. Peters, 2008
Curves and Surfaces for computer-Aided geometric design : A practical Guide / Gerald E. Farin. San Diego : Academic Press, 1997
Recent papers on the geometric modeling research, computer graphics, computer vision and selected applications, especially from kesen.realtimerendering.com

Languages necessary to complete the course:

Slovak and English

Notes:

Past grade distribution
Total number of evaluated students: 144

A	B	C	D	E	FX
93,06	0,0	0,69	0,0	0,69	5,56

Lecturers: doc. RNDr. Andrej Ferko, PhD.

Last change: 22.06.2022

Approved by: doc. RNDr. Pavel Chalmovianský, PhD.

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-163/19	Seminar in Pseudo-Euclidean Geometry (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: 2

Recommended semester: 1., 3.

Educational level: II.

Prerequisites:

Course requirements:
Active participation in discussions and 1-2 papers per semester for doctoral students are expected at this departmental scientific seminar.
Recommended inclusion in the master's study plan
mMPGa / k computer graphics and geometry (conversion program) 2 / W
mMPG computer graphics and geometry 1 / W
mMPGa computer graphics and geometry 1 / W
mMPGa / k computer graphics and geometry (conversion program) 2 / W
Scale of assessment (preliminary/final): Interim evaluation: presentation of a paper at a seminarIndicative assessment scale: A 90%, B 80%, C 70%, D 60%, E 50%Weight of the intermediate / final evaluation: 100/0

Learning outcomes:
The graduate will be able to present mathematical results in front of a professional audience, as well as expert discussion on the referenced topics.

Class syllabus:
Own research. Paper preparation. Presentation at a seminar.

Recommended literature:
Ratcliffe, JG. Foundations of hyperbolic manifolds. Springer 2006.
The latest relevant monographs and articles in world magazines.

Languages necessary to complete the course:
English and Slovak

Notes:

Past grade distribution
Total number of evaluated students: 0

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

Lecturers: Mgr. Ľudovít Balko, PhD., Mgr. Tomáš Rusin, PhD.
Last change: 19.03.2022
Approved by: doc. RNDr. Pavel Chalmovianský, PhD.

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-164/19	Seminar in Pseudo-Euclidean Geometry (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: 2

Recommended semester: 2., 4.

Educational level: II.

Prerequisites:

Course requirements:
Active participation in discussions and 1-2 papers is expected at this scientific seminar of the workplace
per semester for doctoral students.
Recommended inclusion in the master's study plan
mMPGa / k computer graphics and geometry (conversion program) 4 / S
mMPG computer graphics and geometry 3 / S
mMPGa computer graphics and geometry 3 / S
mMPGa / k computer graphics and geometry (conversion program) 4 / S
Scale of assessment (preliminary/final): Weight of the mid-term / final evaluation: Interim evaluation: presentation of the paperat the seminarIndicative assessment scale: A 90%, B 80%, C 70%, D 60%, E 50%Weight of the intermediate / final evaluation: 100/0

Learning outcomes:
The graduate will be able to present mathematical results in front of a professional audience, as well as expert discussion on the referenced topics.

Class syllabus:
Own research. Paper preparation. Presentation at a seminar.

Recommended literature:
Ratcliffe, JG. Foundations of hyperbolic manifolds. Springer 2006.
The latest relevant monographs and articles in world magazines.

Languages necessary to complete the course:
English and Slovak

Notes:

Past grade distribution
Total number of evaluated students: 0

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

Lecturers: Mgr. Ľudovít Balko, PhD., Mgr. Tomáš Rusin, PhD.

Last change: 19.03.2022

Approved by: doc. RNDr. Pavel Chalmovianský, PhD.

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: doc. RNDr. Pavel Chalmovianský, PhD.

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: doc. RNDr. Pavel Chalmovianský, PhD.

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: doc. RNDr. Pavel Chalmovianský, PhD.

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: doc. RNDr. Pavel Chalmovianský, PhD.

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: doc. RNDr. Pavel Chalmovianský, PhD.

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: doc. RNDr. Pavel Chalmovianský, PhD.

COURSE DESCRIPTION

Academic year: 2025/2026

University: Comenius University Bratislava

Faculty: Faculty of Mathematics, Physics and Informatics

Course ID:	**Course title:**
FMFI.KAI/2-AIN-223/24	Virtual and Extended Reality

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: 6

Recommended semester: 1.

Educational level: II.

Prerequisites:

Course requirements:
Continuing evaluation: project (30%) and exercise assignments (10%).
Exam: written exam (60%).
To successfully complete the course, student has to obtain at least 50% of points and the project and on the exercise assignments and at least 50% on the final exam.
Scale: A 90%, B 80%, C 70%, D 60%, E 50%.
Scale of assessment (preliminary/final): Continuing evaluation/Exam: 40/60.

Learning outcomes:
After graduating, students will understand the theoretical foundations and practical skills in creating the team applications in enhanced and virtual reality.

Class syllabus:
Definitions and Basic Concepts, Applications in Industry and Culture
Augmented Reality: Definition of Terms, Applications in Industry and Culture
Hardware for Virtual and Augmented Reality (Input and Output Devices)
Case Study of Augmented Reality Application in Industry (Car Design, Data and Process Visualization in
Factories)
Case Study of Virtual Reality Application in Healthcare (Virtual Therapy, Virtual Physiotherapy)
Registration and Tracking in Augmented Reality (Marker, Markerless, RGBD, GPS)
3D Object Reconstruction, Digital Twin
API and Commercial Software for Virtual and Augmented Reality
Modeling and Visualization Software in Virtual Reality

Recommended literature:
Displays: fundamentals & applications / Hainich, Rolf R., and Oliver Bimber: AK Peters/CRC Press, 2016.
Augmented reality: principles and practice / Schmalstieg, Dieter, and Tobias Hollerer: Addison-Wesley Professional, 2016.
Eswaran, M., and MVA Raju Bahubalendruni. "Challenges and opportunities on AR/VR

technologies for manufacturing systems in the context of industry 4.0: A state of the art review." Journal of Manufacturing Systems 65 (2022): 260-278.

Languages necessary to complete the course:
Slovak, English

Notes:

Past grade distribution
Total number of evaluated students: 7

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

Lecturers: RNDr. Zuzana Berger Haladová, PhD., doc. RNDr. Martin Madaras, PhD., Mgr. Lukáš Gajdošech

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Approved by: doc. RNDr. Pavel Chalmovianský, PhD.