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COURSE DESCRIPTION

University: Comenius University in Bratislava

Faculty: Faculty of Mathematics, Physics and Informatics

Course ID:	**Course title:**
FMFI.KAGDM/2-MPG-104/15	Algebraic Geometry (1)

Educational activities:
Type of activities: lecture
Number of hours:
per week: 3 **per level/semester:** 42
Form of the course: on-site learning

Number of credits: 5

Recommended semester: 2.

Educational level: II.

Prerequisites:

Antirequisites: FMFI.KAGDM/2-MPG-104/00

Course requirements:
Assessment: evaluation
Preliminary assessment: continuous evaluation, tests. For attending the exam, the student should have at least 60% of points from the continuous evaluation.
Final assessment: Final assessment examination 80% (A 90%; B 80%; C 70%; D 60%; E 50%)
Scale of assessment (preliminary/final): 20/80

Learning outcomes:
The graduate gains a basic knowledge of the computation methods of algebraic geometry and is able to use them for specific systems of algebraic equations.

Class syllabus:
1. Affine algebraic varieties. Projective completions of affine algebraic varieties.
2. Special algebraic curves. (Conic sections, cubic curves – classification and basic properties.)
3. Ideals of an algebraic variety. Hilbert basis.
4. Correspondence of algebraic varieties and ideals. Hilbert's "zero-locus-theorem" (Nullstellensatz). Gröbner basis of an ideal. Buchberger's algorithm.
5. Elimination of zero-dimesional ideal and some applications.
6. Algebraic and analytic methods to obtain and compute the roots of an algebraic equation. (Exact method solutions, an approximation of the solutions obtained by Newton's method for k=R or k=C, Sturm's sequences). Moving lines and moving planes methods.
7. Common roots of algebraic equations. Resultant of polynomials in one variable. Newton's polyhedron.

Recommended literature:
Using algebraic geometry / David A. Cox, John Little, Donal O'Shea. New York : Springer, 2005
Computing in algebraic geometry : A quick start using SINGULAR / Wolfram Decker, Christoph Lossen. Berlin : Springer, 2006
Commutative algebra : with a view toward algebraic geometry / David Eisenbud. New York : Springer, 2004

Electronic texts of the lecturer published via the web-site of the course.

Languages necessary to complete the course:
Slovak and English

Notes:

Past grade distribution
Total number of evaluated students: 134

A	B	C	D	E	FX
47,01	11,94	11,94	12,69	16,42	0,0

Lecturers: doc. RNDr. Eduard Boďa, CSc.

Last change: 03.09.2015

Approved by: prof. RNDr. Július Korbaš, CSc.

COURSE DESCRIPTION

University: Comenius University in Bratislava

Faculty: Faculty of Mathematics, Physics and Informatics

Course ID:	**Course title:**
FMFI.KAGDM/2-MPG-241/15	Algebraic Geometry (2)

Educational activities:
Type of activities: lecture
Number of hours:
per week: 2 **per level/semester:** 28
Form of the course: on-site learning

Number of credits: 3

Recommended semester: 4.

Educational level: II.

Prerequisites:

Antirequisites: FMFI.KAGDM/2-MPG-241/00

Course requirements:

Learning outcomes:
The students can deepen their understanding of algebraic geometry by getting a basic knowledge in theory of singularities; they become familiar with frequently used classes of algebraic varieties.

Class syllabus:
Zariski topology. Decomposition of an algebraic variety into irreducible components. Polynomial maps. Rational maps. Tangent space. Tangent cone.
Localization – germ of a subvariety.
Classification of singularities.
Special algebraic varieties: Veronese varieties, Segre varieties, Grassmann varieties and Plücker coordinates, Fano varieties. Determinantal varieties.
Sheaves of varieties. High dimensional resultants.
Rational parametrization of varieties. Criterions of a parametrization (particularly for curves).
Schemes.

Recommended literature:
Algebraic geometry : An introduction / Daniel Perrin ; translated from the French by Catriona Maclean. London : Springer, 2008
Electronic texts by the teacher published on the subject website.

Languages necessary to complete the course:
Slovak and 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. Eduard Boďa, CSc.
Last change: 03.09.2015
Approved by: prof. RNDr. Július Korbaš, CSc.

COURSE DESCRIPTION

University: Comenius University in Bratislava

Faculty: Faculty of Mathematics, Physics and Informatics

Course ID:	**Course title:**
FMFI.KAGDM/2-MPG-165/12	Algebraic Geometry Seminar (1)

Educational activities:
Type of activities: seminar
Number of hours:
per week: 2 **per level/semester:** 28
Form of the course: on-site learning

Number of credits: 2

Recommended semester: 1.

Educational level: II.

Prerequisites:

Course requirements:

Learning outcomes:

Class syllabus:

Recommended literature:

Languages necessary to complete the course:

Notes:

Past grade distribution
Total number of evaluated students: 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: 02.06.2015

Approved by: prof. RNDr. Július Korbaš, CSc.

COURSE DESCRIPTION

University: Comenius University in Bratislava

Faculty: Faculty of Mathematics, Physics and Informatics

Course ID:	**Course title:**
FMFI.KAGDM/2-MPG-166/12	Algebraic Geometry Seminar (2)

Educational activities:
Type of activities: seminar
Number of hours:
per week: 2 **per level/semester:** 28
Form of the course: on-site learning

Number of credits: 2

Recommended semester: 2.

Educational level: II.

Prerequisites:

Course requirements:

Learning outcomes:

Class syllabus:

Recommended literature:

Languages necessary to complete the course:

Notes:

Past grade distribution
Total number of evaluated students: 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., doc. RNDr. Eduard Boďa, CSc.

Last change: 02.06.2015

Approved by: prof. RNDr. Július Korbaš, CSc.

COURSE DESCRIPTION

University: Comenius University in Bratislava

Faculty: Faculty of Mathematics, Physics and Informatics

Course ID:	**Course title:**
FMFI.KI/2-MPG-106/00	Algorithms and Data Structures

Educational activities:
Type of activities: lecture / practicals
Number of hours:
per week: 2 / 1 **per level/semester:** 28 / 14
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: 143

A	B	C	D	E	FX
17,48	16,08	16,78	19,58	29,37	0,7

Lecturers: RNDr. Peter Kostolányi, PhD., doc. RNDr. Dana Pardubská, CSc.

Last change: 02.09.2015

Approved by: prof. RNDr. Július Korbaš, CSc.

COURSE DESCRIPTION

University: Comenius University in 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:** 28
Form of the course: on-site learning

Number of credits: 3

Recommended semester: 3.

Educational level: II.

Prerequisites:

Antirequisites: FMFI.KMANM/2-MPG-113/00

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

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: 94

A	B	C	D	E	FX
48,94	19,15	20,21	7,45	4,26	0,0

Lecturers: Mgr. Jela Babušíková, PhD.

Last change: 03.09.2015
Approved by: prof. RNDr. Július Korbaš, CSc.

COURSE DESCRIPTION

University: Comenius University in Bratislava

Faculty: Faculty of Mathematics, Physics and Informatics

Course ID:	**Course title:**
FMFI.KAGDM/2-MPG-150/15	CAD Systems

Educational activities:
Type of activities: course
Number of hours:
per week: 2 **per level/semester:** 28
Form of the course: on-site learning

Number of credits: 3

Recommended semester: 2.

Educational level: II.

Prerequisites:

Antirequisites: FMFI.KAGDM/2-MPG-150/00

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

Learning outcomes:
After completing the course, students will be able to work with CAD systems: LibreCAD, SketchUp, SweetHome 3D and FreeCAD at the intermediate level.

Class syllabus:
1. Drawing basic shapes in LibreCAD (line segments, rectangles, arcs and polygons).
2. Dimensioning, hatching, blocks creating and manipulation with blocks, work with layers.
3. More advanced functions of LibreCAD – trimming, arcs and lines connecting, work with text, dimensioning marks adjusting, etc.
4. Basics of work in SketchUp. Layout description, environment adjusting (toolbar, layout). Push and move tools usage. Creating simple basic objects.
5. Usage of further tools of SketchUp.
6. Interesting SketchUp plugins overview.
7. Basics of work in Sweet Home 3D (creating walls, rooms, adding and placing of furniture; adjustment of colours and sizes).
8. Sweet Home extensions, adjustment of texts, skew walls creating, work with lights, adjusting colours, import of own models and new objects.
9. Basics work in FreeCAD. Layout description, creating simple objects.

Recommended literature:
AutoCad Release 12 : Průvodce příkazy a funkcemi : Popis příkazů a funkcí s rozlišením verzí 10, 11 a 12 / Jiří Hlavenka. Brno : CCB, 1992
CAD systémy / Róbert Bohdal. http://flurry.dg.fmph.uniba.sk/webog/sk/bohdal-vyucba/85-aut-int-proj.html

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
66,67	14,67	13,33	2,67	2,67	0,0

Lecturers: RNDr. Róbert Bohdal, PhD.

Last change: 03.09.2015

Approved by: prof. RNDr. Július Korbaš, CSc.

COURSE DESCRIPTION

University: Comenius University in Bratislava	
Faculty: Faculty of Mathematics, Physics and Informatics	
Course ID: FMFI.KAI/2-MPG-246/15	**Course title:** Colour Image Processing

Educational activities:
Type of activities: lecture / practicals
Number of hours:
per week: 2 / 2 **per level/semester:** 28 / 28
Form of the course: on-site learning

Number of credits: 6

Recommended semester: 4.

Educational level: II.

Prerequisites:

Antirequisites: FMFI.KAI/2-AIN-273/11

Course requirements:
E at least 50%

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

Class syllabus:
Light and colour, the human visual system.
Colour image quantization, determination of the palette.
Colour morphology.
Finding of corners, filtering of colour images.
Segmentation and its use.
Colour -to-grayscale and vice versa conversions.
Colour stability, shadow removal.
Mapping of the colour range.
Colour models.

Recommended literature:
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
Elena Šikudová, Zuzana Černeková, Vanda Benešová, Zuzana Haladová, Júlia Kučerová: Počítačové videnie. Detekcia a rozpoznávanie objektov, vydavateľstvo Wikina, Praha, ISBN: 978-80-87925-06-5

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: RNDr. Zuzana Černeková, PhD.

Last change: 03.09.2015

Approved by: prof. RNDr. Július Korbaš, CSc.

COURSE DESCRIPTION

University: Comenius University in Bratislava

Faculty: Faculty of Mathematics, Physics and Informatics

Course ID:	**Course title:**
FMFI.KAGDM/2-MPG-218/15	Complexity Theory

Educational activities:
Type of activities: lecture
Number of hours:
per week: 3 **per level/semester:** 42
Form of the course: on-site learning

Number of credits: 5

Recommended semester: 4.

Educational level: II.

Prerequisites:

Antirequisites: FMFI.KI/2-AIN-106/00

Course requirements:
Assessment: evaluation
Preliminary assessment: Continuous assessment, individual work, paper. For attenting 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: 03.09.2015

Approved by: prof. RNDr. Július Korbaš, CSc.

COURSE DESCRIPTION

University: Comenius University in Bratislava

Faculty: Faculty of Mathematics, Physics and Informatics

Course ID:	**Course title:**
FMFI.KAGDM/2-MPG-203/00	Computational Geometry

Educational activities:
Type of activities: course
Number of hours:
per week: 4 **per level/semester:** 56
Form of the course: on-site learning

Number of credits: 5

Recommended semester: 3.

Educational level: II.

Prerequisites:

Course requirements:
Assessment: evaluation
Preliminary assessment: paper
Final assessment: 60% Final evaluation examination (oral)
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: 139

A	B	C	D	E	FX
28,78	10,79	15,83	13,67	12,95	17,99

Lecturers: doc. RNDr. Pavel Chalmovianský, PhD.

Last change: 03.09.2015

Approved by: prof. RNDr. Július Korbaš, CSc.

COURSE DESCRIPTION

University: Comenius University in Bratislava

Faculty: Faculty of Mathematics, Physics and Informatics

Course ID:	**Course title:**
FMFI.KAGDM/2-MPG-142/00	Computer Constructive Geometry

Educational activities:
Type of activities: lecture
Number of hours:
per week: 2 **per level/semester:** 28
Form of the course: on-site learning

Number of credits: 3

Recommended semester: 1.

Educational level: II.

Prerequisites:

Course requirements:

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: 66

A	B	C	D	E	FX
39,39	19,7	28,79	6,06	4,55	1,52

Lecturers: RNDr. Soňa Kudličková, CSc.
Last change: 02.09.2015
Approved by: prof. RNDr. Július Korbaš, CSc.

STATE EXAM DESCRIPTION

University: Comenius University in Bratislava	
Faculty: Faculty of Mathematics, Physics and Informatics	
Course ID: FMFI.KAGDM/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: prof. RNDr. Július Korbaš, CSc.	

COURSE DESCRIPTION

University: Comenius University in Bratislava

Faculty: Faculty of Mathematics, Physics and Informatics

Course ID:	**Course title:**
FMFI.KAGDM/2-MPG-101/00	Computer Graphics (1)

Educational activities:
Type of activities: lecture / practicals
Number of hours:
per week: 2 / 2 **per level/semester:** 28 / 28
Form of the course: on-site learning

Number of credits: 5

Recommended semester: 1.

Educational level: II.

Prerequisites:

Course requirements:

Learning outcomes:
To provide students with fundamental techniques in computer graphics.

Class syllabus:
Graphical input and output devices. Computer graphics basics: half-toning, font generation, surfaces tessellation, clipping and intersections, rasterization, area filling. Specialized data structures and object representation. Winged edges and half-edges, DCEL, meshes, B-rep, sweeping, CSG, implicit functions and F-rep. Spatial subdivision techniques, wavelets, procedural, deformable, and multiresolution techniques. Data fitting. Object reconstructions.

Recommended literature:
E. Ružický, Úvod do počítačovej grafiky, skriptá, MFF UK Bratislava, 1991
J. Žára et al., Počítačová grafika, princípy a algoritmy, Grada, Praha 1992
E. Ružický, A. Ferko, Počítačová grafika a spracovanie obrazu, Sapientia, Bratislava 1995
J. Žára, et al. Moderní počítačová grafika, Computer Press, Praha 2004

Languages necessary to complete the course:
Slovak and English

Notes:

Past grade distribution
Total number of evaluated students: 575

A	B	C	D	E	FX
14,09	13,39	16,17	20,87	22,26	13,22

Lecturers: RNDr. Martina Bátorová, PhD.

Last change: 16.09.2015

Approved by: prof. RNDr. Július Korbaš, CSc.

COURSE DESCRIPTION

University: Comenius University in Bratislava

Faculty: Faculty of Mathematics, Physics and Informatics

Course ID:	**Course title:**
FMFI.KAGDM/2-MPG-102/00	Computer Graphics (2)

Educational activities:
Type of activities: lecture / practicals
Number of hours:
per week: 2 / 2 **per level/semester:** 28 / 28
Form of the course: on-site learning

Number of credits: 5

Recommended semester: 2.

Educational level: II.

Prerequisites: FMFI.KAGDM/2-MPG-101/00 - Computer Graphics (1)

Course requirements:

Learning outcomes:
To provide students with the knowledge of advanced techniques for photorealistic computer graphics.

Class syllabus:
Algorithms for visibility and shadows. Radiometry, light, colors, textures. Local, global and volumetric illumination models (lighting, rendering, volumetric equation). Experimental illumination models (transparency, participating media, gamma-correction). Methods for local and global illumination. Ray-tracing, ray/object intersection, computing of energy contributions, another tracing types (path, photon). Radiosity notion and radiosity equation. Model of heat transfer. Form-factors. Basic steps in radiosity computations. Ray tracing and radiosity – rendering quality comparison.

Recommended literature:
Moderní počítačová grafika / Jiří Žára ... [et al.]. Brno : Computer Press, 2010
Matematická analýza 3 : Integrálny počet v Rn / Vladimír Ďurikovič, Roman Ďurikovič. Trnava : Univerzita sv. Cyrila a Metoda, 2008
Electronic texts by the teacher, published on the WWW page of the class.

Languages necessary to complete the course:
Slovak and English

Notes:

Past grade distribution
Total number of evaluated students: 263

A	B	C	D	E	FX
14,83	19,01	23,95	17,87	16,35	7,98

Lecturers: RNDr. Róbert Bohdal, PhD.

Last change: 02.09.2015

Approved by: prof. RNDr. Július Korbaš, CSc.

COURSE DESCRIPTION

University: Comenius University in Bratislava	
Faculty: Faculty of Mathematics, Physics and Informatics	
Course ID: FMFI.KAGDM/2-MPG-201/15	**Course title:** Computer Graphics (3)
Educational activities: **Type of activities:** lecture / practicals **Number of hours:** **per week:** 2 / 1 **per level/semester:** 28 / 14 **Form of the course:** on-site learning	
Number of credits: 4	
Recommended semester: 3.	
Educational level: II.	
Prerequisites:	
Course requirements: Preliminary assessment: continuous asessment, projects; for final examination there is required at least 50% of points from the continuous asessment. Final assessment: 60% Final evaluation examination Scale of assessment (preliminary/final): 40/60	
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: 138

A	B	C	D	E	FX
36,23	29,71	14,49	7,97	1,45	10,14

Lecturers: doc. RNDr. Andrej Ferko, PhD., RNDr. Miroslava Valíková, PhD.

Last change: 03.09.2015

Approved by: prof. RNDr. Július Korbaš, CSc.

COURSE DESCRIPTION

University: Comenius University in 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:** 28
Form of the course: on-site learning

Number of credits: 3

Recommended semester: 1.

Educational level: II.

Prerequisites:

Course requirements:
presentations, quiz
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 in journal IEEE Computer and Graphics Applications
Internet

Languages necessary to complete the course:

Notes:

Past grade distribution
Total number of evaluated students: 166

A	B	C	D	E	FX
53,01	13,86	17,47	6,63	5,42	3,61

Lecturers: prof. RNDr. Roman Ďurikovič, PhD.

Last change: 22.09.2017

Approved by: prof. RNDr. Július Korbaš, CSc.

COURSE DESCRIPTION

University: Comenius University in Bratislava

Faculty: Faculty of Mathematics, Physics and Informatics

Course ID:	**Course title:**
FMFI.KAI+KAGDM/2-MPG-125/15	Computer Vision

Educational activities:
Type of activities: lecture / practicals
Number of hours:
per week: 2 / 2 **per level/semester:** 28 / 28
Form of the course: on-site learning

Number of credits: 6

Recommended semester: 1.

Educational level: II.

Prerequisites:

Course requirements:
Assessment: evaluation
Preliminary assessment: Continuous assessment projects
Final assessment: assessment examination 60% (A 90%; B 80%; C 70%; D 60%; E 50%)
Scale of assessment (preliminary/final): 40/60

Learning outcomes:
Graduates will know the advance techniques of machine vision, image recognition and processing, such as feature extraction from images, face detection and tracking, identification of significant areas in the image, etc.

Class syllabus:
Features (low and medium, global, local), extraction.
A selection from the database DB.
Detection, face tracking.
Color gamut mapping.
HDR.
Eye movement tracking.
Significant areas in the image.
Image quality.

Recommended literature:
Feature extraction : Foundations and applications / Isabelle Guyon ... [et al.] (eds.). Berlin : Springer, 2006
Algorithms for image processing and computer vision / J. R. Parker. New York : Wiley, 1997
Shape classification and analysis : Theory and practice / Luciano da Fontoura Costa, Roberto Marcondes Cesar, Jr.. Boca Raton, Fla. : CRC Press, 2009
Elena Šikudová, Zuzana Černeková, Vanda Benešová, Zuzana Haladová, Júlia Kučerová: Počítačové videnie. Detekcia a rozpoznávanie objektov, vydavateľstvo Wikina, Praha, ISBN: 978-80-87925-06-5

Languages necessary to complete the course:

Slovak and English

Notes:

Past grade distribution
Total number of evaluated students: 46

A	B	C	D	E	FX
13,04	10,87	23,91	23,91	10,87	17,39

Lecturers: Mgr. Ľudovít Balko, PhD., RNDr. Zuzana Berger Haladová, PhD.

Last change: 14.01.2016

Approved by: prof. RNDr. Július Korbaš, CSc.

COURSE DESCRIPTION

University: Comenius University in Bratislava	
Faculty: Faculty of Mathematics, Physics and Informatics	
Course ID: FMFI.KAGDM+KAI/2-MPG-167/15	**Course title:** Data Compresion
Educational activities: **Type of activities:** lecture **Number of hours:** **per week:** 2 **per level/semester:** 28 **Form of the course:** on-site learning	
Number of credits: 3	
Recommended semester: 2.	
Educational level: II.	
Prerequisites:	
Antirequisites: FMFI.KAI/2-AIN-126/00	
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, CSc.

Last change: 03.09.2015

Approved by: prof. RNDr. Július Korbaš, CSc.

COURSE DESCRIPTION

University: Comenius University in Bratislava

Faculty: Faculty of Mathematics, Physics and Informatics

Course ID:	**Course title:**
FMFI.KAGDM/2-MPG-108/15	Differential Geometry

Educational activities:
Type of activities: lecture
Number of hours:
per week: 3 **per level/semester:** 42
Form of the course: on-site learning

Number of credits: 5

Recommended semester: 1.

Educational level: II.

Prerequisites:

Course requirements:
Preliminary assessment: continuous evaluation, tests
Final assessment: Final assessment examination 80% (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: 172

A	B	C	D	E	FX
37,21	20,93	18,02	9,88	11,63	2,33

Lecturers: doc. RNDr. Miloš Božek, CSc.

Last change: 03.09.2015

Approved by: prof. RNDr. Július Korbaš, CSc.

COURSE DESCRIPTION

University: Comenius University in Bratislava

Faculty: Faculty of Mathematics, Physics and Informatics

Course ID:	**Course title:**
FMFI.KAGDM/2-MPG-245/00	Digital and Computational Photography

Educational activities:
Type of activities: lecture
Number of hours:
per week: 2 **per level/semester:** 28
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, CSc., Mgr. Tomáš Kovačovský
Last change: 02.09.2015
Approved by: prof. RNDr. Július Korbaš, CSc.

COURSE DESCRIPTION

University: Comenius University in Bratislava

Faculty: Faculty of Mathematics, Physics and Informatics

Course ID:	**Course title:**
FMFI.KAGDM/2-MPG-910/00	Diploma Thesis (1)

Educational activities:
Type of activities: independent work
Number of hours:
per week: 6 **per level/semester:** 84
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: 127

A	B	C	D	E	FX
42,52	13,39	15,75	7,09	10,24	11,02

Lecturers: prof. RNDr. Július Korbaš, CSc.

Last change: 02.09.2015

Approved by: prof. RNDr. Július Korbaš, CSc.

COURSE DESCRIPTION

University: Comenius University in Bratislava

Faculty: Faculty of Mathematics, Physics and Informatics

Course ID:	**Course title:**
FMFI.KAGDM/2-MPG-911/00	Diploma Thesis (2)

Educational activities:
Type of activities: independent work
Number of hours:
per week: 10 **per level/semester:** 140
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: 111

A	B	C	D	E	FX
61,26	8,11	12,61	4,5	10,81	2,7

Lecturers: prof. RNDr. Július Korbaš, CSc.

Last change: 02.09.2015

Approved by: prof. RNDr. Július Korbaš, CSc.

STATE EXAM DESCRIPTION

University: Comenius University in Bratislava	
Faculty: Faculty of Mathematics, Physics and Informatics	
Course ID: FMFI.KAGDM/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: prof. RNDr. Július Korbaš, CSc.	

COURSE DESCRIPTION

University: Comenius University in Bratislava

Faculty: Faculty of Mathematics, Physics and Informatics

Course ID:	**Course title:**
FMFI.KAGDM/2-MPG-920/00	Diploma Thesis Seminar (1)

Educational activities:
Type of activities: seminar
Number of hours:
per week: 2 **per level/semester:** 28
Form of the course: on-site learning

Number of credits: 2

Recommended semester: 2.

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 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: 137

A	B	C	D	E	FX
75,18	0,73	8,03	0,0	13,87	2,19

Lecturers: doc. RNDr. Andrej Ferko, PhD.

Last change: 03.09.2015

Approved by: prof. RNDr. Július Korbaš, CSc.

COURSE DESCRIPTION

University: Comenius University in Bratislava	
Faculty: Faculty of Mathematics, Physics and Informatics	
Course ID: FMFI.KAGDM/2-MPG-921/00	**Course title:** Diploma Thesis Seminar (2)
Educational activities: **Type of activities:** seminar **Number of hours:** **per week:** 2 **per level/semester:** 28 **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: 133					
A	B	C	D	E	FX
67,67	3,76	15,04	0,0	2,26	11,28
Lecturers: doc. RNDr. Andrej Ferko, PhD.					
Last change: 03.09.2015					
Approved by: prof. RNDr. Július Korbaš, CSc.					

COURSE DESCRIPTION

University: Comenius University in Bratislava

Faculty: Faculty of Mathematics, Physics and Informatics

Course ID:	**Course title:**
FMFI.KAI/2-MPG-149/00	Fractal Modelling

Educational activities:
Type of activities: lecture
Number of hours:
per week: 2 **per level/semester:** 28
Form of the course: on-site learning

Number of credits: 3

Recommended semester: 2.

Educational level: II.

Prerequisites:

Course requirements:
Assessment: evaluation
Preliminary assessment: 100% Continuous assessment, tests
Final assessment: 0% Final assessment exam
A 90%, B 80%, C 70%, D 60%, E 50%

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: 03.09.2015

Approved by: prof. RNDr. Július Korbaš, CSc.

STATE EXAM DESCRIPTION

University: Comenius University in Bratislava	
Faculty: Faculty of Mathematics, Physics and Informatics	
Course ID: FMFI.KAGDM/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: prof. RNDr. Július Korbaš, CSc.	

COURSE DESCRIPTION

University: Comenius University in Bratislava	
Faculty: Faculty of Mathematics, Physics and Informatics	
Course ID: FMFI.KAGDM/2-MPG-112/00	**Course title:** Image Processing and Encoding
Educational activities: **Type of activities:** lecture **Number of hours:** **per week:** 2 **per level/semester:** 28 **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: 120

A	B	C	D	E	FX
84,17	12,5	2,5	0,0	0,83	0,0

Lecturers: prof. Ing. Jaroslav Polec, CSc.

Last change: 03.09.2015

Approved by: prof. RNDr. Július Korbaš, CSc.

COURSE DESCRIPTION

University: Comenius University in Bratislava

Faculty: Faculty of Mathematics, Physics and Informatics

Course ID:	**Course title:**
FMFI.KAGDM/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:** 28 / 28
Form of the course: on-site learning

Number of credits: 5

Recommended semester: 1.

Educational level: II.

Prerequisites:

Course requirements:
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: 79

A	B	C	D	E	FX
31,65	8,86	20,25	11,39	5,06	22,78

Lecturers: doc. RNDr. Pavel Chalmovianský, PhD.
Last change: 03.09.2015
Approved by: prof. RNDr. Július Korbaš, CSc.

COURSE DESCRIPTION

University: Comenius University in Bratislava

Faculty: Faculty of Mathematics, Physics and Informatics

Course ID:	**Course title:**
FMFI.KAGDM/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:** 28 / 28
Form of the course: on-site learning

Number of credits: 5

Recommended semester: 2.

Educational level: II.

Prerequisites:

Course requirements:

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: 88

A	B	C	D	E	FX
26,14	12,5	17,05	17,05	5,68	21,59

Lecturers: doc. RNDr. Pavel Chalmovianský, PhD.

Last change: 02.09.2015

Approved by: prof. RNDr. Július Korbaš, CSc.

COURSE DESCRIPTION

University: Comenius University in Bratislava

Faculty: Faculty of Mathematics, Physics and Informatics

Course ID:	**Course title:**
FMFI.KAGDM/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:** 28
Form of the course: on-site learning

Number of credits: 3

Recommended semester: 3.

Educational level: II.

Prerequisites:

Course requirements:

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: 27

A	B	C	D	E	FX
66,67	11,11	7,41	3,7	0,0	11,11

Lecturers: doc. RNDr. Pavel Chalmovianský, PhD.

Last change: 02.09.2015
Approved by: prof. RNDr. Július Korbaš, CSc.

COURSE DESCRIPTION

University: Comenius University in Bratislava	
Faculty: Faculty of Mathematics, Physics and Informatics	
Course ID: FMFI.KAGDM/2-MPG-217/10	**Course title:** Modelling of Curves and Surfaces (4)
Educational activities: **Type of activities:** lecture **Number of hours:** **per week:** 2 **per level/semester:** 28 **Form of the course:** on-site learning	
Number of credits: 3	
Recommended semester: 4.	
Educational level: II.	
Prerequisites:	
Course requirements: 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: 03.09.2015

Approved by: prof. RNDr. Július Korbaš, CSc.

COURSE DESCRIPTION

University: Comenius University in Bratislava

Faculty: Faculty of Mathematics, Physics and Informatics

Course ID:	**Course title:**
FMFI.KAI/2-MPG-168/14	Multimedia and Sound Processing

Educational activities:
Type of activities: lecture
Number of hours:
per week: 2 **per level/semester:** 28
Form of the course: on-site learning

Number of credits: 3

Recommended semester: 2.

Educational level: II.

Prerequisites:

Antirequisites: FMFI.KAI/2-AIN-274/00

Course requirements:

Learning outcomes:

Class syllabus:

Recommended literature:

Languages necessary to complete the course:

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: Ľubomír Lúčan, CSc.

Last change: 02.06.2015

Approved by: prof. RNDr. Július Korbaš, CSc.

COURSE DESCRIPTION

University: Comenius University in Bratislava

Faculty: Faculty of Mathematics, Physics and Informatics

Course ID:	**Course title:**
FMFI.KAGDM/2-MPG-143/00	Multiview Geometry

Educational activities:
Type of activities: lecture
Number of hours:
per week: 2 **per level/semester:** 28
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:
To acquaint the students with basic methods of scene reconstruction from several images.

Class syllabus:
Elements of projective geometry of 2- and 3-space. One-view process. Camera calibration, self-calibration. Two-views process. Epipolar geometry. Fundamental matrix. Projective, affine and Euclidean reconstructions of a scene. Three-views geometry. Trifocal tensor. Reconstruction of a scene from multiple views.

Recommended literature:
Projektívna geometria / Štefan Solčan. Bratislava : MFF UK, 1995
Spatial Augmented Reality - Merging Real and Virtual Worlds / Bimber O., Raskar R. , A K Peters, 2005, PDF online na predmetovej stránke.
Multiple View Geometry in computer vision /Hartley, R. and Zisserman,R:Cambridge University Press,2000
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: 15

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

Lecturers: doc. RNDr. Valentín Zaťko, CSc.

Last change: 16.09.2015

Approved by: prof. RNDr. Július Korbaš, CSc.

COURSE DESCRIPTION

University: Comenius University in Bratislava

Faculty: Faculty of Mathematics, Physics and Informatics

Course ID:	**Course title:**
FMFI.KAGDM/2-MPG-161/12	Numerical Geometry Seminar (1)

Educational activities:
Type of activities: seminar
Number of hours:
per week: 2 **per level/semester:** 28
Form of the course: on-site learning

Number of credits: 2

Recommended semester: 1.

Educational level: II.

Prerequisites:

Course requirements:

Learning outcomes:

Class syllabus:

Recommended literature:

Languages necessary to complete the course:

Notes:

Past grade distribution
Total number of evaluated students: 2

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

Lecturers: doc. RNDr. Andrej Ferko, PhD.

Last change: 02.06.2015

Approved by: prof. RNDr. Július Korbaš, CSc.

COURSE DESCRIPTION

University: Comenius University in Bratislava	
Faculty: Faculty of Mathematics, Physics and Informatics	
Course ID: FMFI.KAGDM/2-MPG-162/12	**Course title:** Numerical Geometry Seminar (2)
Educational activities: **Type of activities:** seminar **Number of hours:** **per week:** 2 **per level/semester:** 28 **Form of the course:** on-site learning	
Number of credits: 2	
Recommended semester: 2.	
Educational level: II.	
Prerequisites:	
Course requirements:	
Learning outcomes:	
Class syllabus:	
Recommended literature:	
Languages necessary to complete the course:	
Notes:	

Past grade distribution
Total number of evaluated students: 1

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: 02.06.2015	
Approved by: prof. RNDr. Július Korbaš, CSc.	

COURSE DESCRIPTION

University: Comenius University in Bratislava

Faculty: Faculty of Mathematics, Physics and Informatics

Course ID:	**Course title:**
FMFI.KAGDM+KMANM/2-MPG-243/15	Numerical Mathematics for Graphic Designers

Educational activities:
Type of activities: lecture
Number of hours:
per week: 3 **per level/semester:** 42
Form of the course: on-site learning

Number of credits: 4

Recommended semester: 2.

Educational level: II.

Prerequisites:

Antirequisites: FMFI.KMANM/2-MPG-243/00

Course requirements:

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 models in numerical mathematics. Numerical stability and robustness, error analysis. Approximation theory. Numerical algebra. Solutions of large sparse systems of linear equations. Roots of nonlinear equations. Numerical differentiation and integration. Finite difference method and finite element method. Introduction to numerical solutions of differential equations. Work with libraries of numerical methods.

Recommended literature:
Matlab / Jela Babušíková. Bratislava : Knižničné a edičné centrum FMFI UK, 2007
A first course in numerical analysis / Anthony Ralston. New York : McGraw Hill, 1965

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	20,0	10,0	0,0	10,0	0,0

Lecturers: Mgr. Jela Babušíková, PhD.

Last change: 03.09.2015

Approved by: prof. RNDr. Július Korbaš, CSc.

COURSE DESCRIPTION

University: Comenius University in Bratislava

Faculty: Faculty of Mathematics, Physics and Informatics

Course ID:	**Course title:**
FMFI.KAGDM/2-MPG-145/15	PC Graphics Devices Architecture

Educational activities:
Type of activities: lecture
Number of hours:
per week: 2 **per level/semester:** 28
Form of the course: on-site learning

Number of credits: 3

Recommended semester: 1.

Educational level: II.

Prerequisites:

Antirequisites: FMFI.KAGDM/2-MPG-145/00

Course requirements:
Preliminary assessment: 100% Continuous assessment, home works, tests
Final assessment: 0% Final assessment exam
A 90%, B 80%, C 70%, D 60%, E 50%
Scale of assessment (preliminary/final): 100/0

Learning outcomes:
After completing the course, students will 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 structure and usage of commonly used graphics and multimedia files.

Class syllabus:
1. Displaying devices (monitors and displays).
2. Devices displaying 3D images (stereoscopical and volume displays).
3. Projectors technology (LCD, DLP, ...).
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. Communication of graphical devices with PC.
9. Graphics cards functions.
10. OpenGL, DirectX, SDL – API overview.
11. Architecture of displaying devices.
12. Graphics files formats, compressions.
13. The principle of JPEG and MPEG compression and their usage.

Recommended literature:
Fundamentals of interactive computer graphics / James D. Foley, Andries van Dam. Reading : Addison-Wesley, 1983

Encyclopedia of Graphics File Formats, 2nd Edition / J. D. Murray, W. van Ryper. O'Reilly Media, 1996
Architektúra grafických zariadení pre PC / Róbert Bohdal. http://flurry.dg.fmph.uniba.sk/webog/sk/bohdal-vyucba/83-architektura.html, 2013

Languages necessary to complete the course:
Slovak and English

Notes:

Past grade distribution
Total number of evaluated students: 157

A	B	C	D	E	FX
61,15	25,48	7,01	4,46	1,27	0,64

Lecturers: RNDr. Róbert Bohdal, PhD.

Last change: 03.09.2015

Approved by: prof. RNDr. Július Korbaš, CSc.

COURSE DESCRIPTION

University: Comenius University in 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:** 28 / 28
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: 137					
A	B	C	D	E	FX
8,76	17,52	27,74	21,9	12,41	11,68
Lecturers: doc. RNDr. Milan Ftáčnik, CSc., RNDr. Zuzana Berger Haladová, PhD.					
Last change: 22.09.2017					
Approved by: prof. RNDr. Július Korbaš, CSc.					

COURSE DESCRIPTION

University: Comenius University in Bratislava

Faculty: Faculty of Mathematics, Physics and Informatics

Course ID:	**Course title:**
FMFI.KAGDM/2-MPG-211/15	Procedural Modelling

Educational activities:
Type of activities: course
Number of hours:
per week: 2 **per level/semester:** 28
Form of the course: on-site learning

Number of credits: 3

Recommended semester: 3.

Educational level: II.

Prerequisites:

Antirequisites: FMFI.KAI/2-MPG-211/00

Course requirements:
Assessment: evaluation
Preliminary assessment: 0% Continuous assessment, tests, projects
Final assessment: 100% Evaluation of the student‘s project
Scale of assessment (preliminary/final): 0/100

Learning outcomes:
After completing the course, the students will know how to use the technique of procedural modelling for creating complexly large objects and scenes using given functions or rules.

Class syllabus:
1. Pseudorandom sequences generators.
2. Procedural creation of 2D and 3D geometry.
3. Noises and turbulences.
4. Fractals for procedural modelling.
5. Georelief and cities modelling.
6. Reaction diffusion, biological mechanisms of creation of exodermal patterns.
7. Cellular automata, demographic models.
8. Procedural textures.
9. Particle systems.
10. Genetic and evolutionary algorithms.

Recommended literature:
Fractals everywhere / Michael F. Barnsley. San Francisco : Morgan Kaufmann, 1993
Texturing and Modeling. A procedural approach / David Ebert at al. Morgan Kaufmann, 2002
Moodle or course web page with digital texts of the lecturer.

Languages necessary to complete the course:
Slovak and English

Notes:

Past grade distribution
Total number of evaluated students: 36

A	B	C	D	E	FX
58,33	25,0	0,0	11,11	5,56	0,0

Lecturers: RNDr. Róbert Bohdal, PhD.

Last change: 03.09.2015

Approved by: prof. RNDr. Július Korbaš, CSc.

COURSE DESCRIPTION

University: Comenius University in Bratislava

Faculty: Faculty of Mathematics, Physics and Informatics

Course ID:	**Course title:**
FMFI.KAGDM/2-MPG-141/00	Projective Geometry

Educational activities:
Type of activities: lecture
Number of hours:
per week: 2 **per level/semester:** 28
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: 82

A	B	C	D	E	FX
56,1	29,27	8,54	4,88	1,22	0,0

Lecturers: doc. RNDr. Štefan Solčan, CSc.

Last change: 02.09.2015

Approved by: prof. RNDr. Július Korbaš, CSc.

COURSE DESCRIPTION

University: Comenius University in Bratislava

Faculty: Faculty of Mathematics, Physics and Informatics

Course ID:	**Course title:**
FMFI.KAGDM/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:** 28
Form of the course: on-site learning

Number of credits: 2

Recommended semester: 4.

Educational level: II.

Prerequisites:

Course requirements:

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: 124					
A	B	C	D	E	FX
92,74	0,0	0,81	0,0	0,81	5,65
Lecturers: doc. RNDr. Andrej Ferko, PhD.					
Last change: 02.09.2015					
Approved by: prof. RNDr. Július Korbaš, CSc.					

COURSE DESCRIPTION

University: Comenius University in Bratislava

Faculty: Faculty of Mathematics, Physics and Informatics

Course ID:	**Course title:**
FMFI.KAGDM/2-MPG-105/15	Topology and Functional Analysis

Educational activities:
Type of activities: course
Number of hours:
per week: 5 **per level/semester:** 70
Form of the course: on-site learning

Number of credits: 7

Recommended semester: 2.

Educational level: II.

Prerequisites:

Antirequisites: FMFI.KAGDM/2-MPG-105/00

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): 0/100

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

Class syllabus:
Metric topology. Topological spaces. Continuous mappins. Basic constructions of topological spaces. Countability axioms. Separation axioms (T1 – T4). Connectedness. Compactness. Topological manifolds and their discrete representations.
Linear normed spaces, linear continuous functionals and operators, Banach spaces. Hilbert spaces, orthonormal bases, Fourier coefficients. Spaces of continuous functions, the Stone – Weierstrass theorem, dual of the space C(I). Applications of the functional analysis in Image Processing.

Recommended literature:
Elements of the theory of functional analysis : Volume 1 and 2 : Two volumes bound as one / A. N. Kolmogorov, S. V. Fomin. New York : Dover, 1999
Funkcionálna analýza / Ladislav Mišík. Bratislava : Alfa, 1989
Topology and geometry / Glen E. Bredon. New York : Springer, 1993
Vlastné elektronické texty vyučujúceho predmetu zverejňované prostredníctvom web stránky predmetu.
Engelking, Ryszard General topology. Rev. and compl. ed. Sigma Series in Pure Mathematics, 6. Berlin: Heldermann Verlag. viii, 529 p. ,1989.

Languages necessary to complete the course:
Slovak and English

Notes:

Past grade distribution
Total number of evaluated students: 139

A	B	C	D	E	FX
14,39	17,27	23,74	15,11	17,99	11,51

Lecturers: doc. RNDr. Pavel Chalmovianský, PhD.

Last change: 03.09.2015

Approved by: prof. RNDr. Július Korbaš, CSc.

COURSE DESCRIPTION

University: Comenius University in Bratislava

Faculty: Faculty of Mathematics, Physics and Informatics

Course ID:	**Course title:**
FMFI.KAI+KAGDM/2-AIN-223/15	Virtual and Extended Reality

Educational activities:
Type of activities: lecture / practicals
Number of hours:
per week: 2 / 2 **per level/semester:** 28 / 28
Form of the course: on-site learning

Number of credits: 6

Recommended semester: 1.

Educational level: II.

Prerequisites:

Course requirements:
tests, project, written and oral exam
Scale: A 90%, B 80%, C 70%, D 60%, E 50%
Scale of assessment (preliminary/final): 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:
Virtual reality, definitions and basic concepts. Description language VR. Authoring tools. Virtual interaction by Qvortrup. Virtual galleries, museums and cities. Selected Techniques of virtual population (avatars, autonomous agents). Augmented Reality, definition of terms, history, major milestones, motivation, augmented reality applications. System for augmented reality: inputs, outputs, hardware, Fish Tank- basic tools. Registration in Augmented Reality (Marker, Markerless, rgbda, GPS) Mobile Augmented Reality (Vuforia, Layar, Metaio ...) Spatial Augmented Reality-aided design (hardware calibration, the combination of projectors)

Recommended literature:
Real-time rendering / Tomas Akenine-Möller, Eric Haines, Naty Hoffman. Wellesley : A. K. Peters, 2008
Vlastné elektronické texty vyučujúceho predmetu zverejňované prostredníctvom web stránky predmetu.

Languages necessary to complete the course:

Notes:

Past grade distribution
Total number of evaluated students: 24

A	B	C	D	E	FX
45,83	33,33	12,5	0,0	0,0	8,33

Lecturers: doc. RNDr. Andrej Ferko, PhD., RNDr. Zuzana Berger Haladová, PhD.
Last change: 23.09.2017
Approved by: prof. RNDr. Július Korbaš, CSc.

COURSE DESCRIPTION

University: Comenius University in Bratislava

Faculty: Faculty of Mathematics, Physics and Informatics

Course ID:	**Course title:**
FMFI.KAGDM/2-MPG-136/15	www - New Trends

Educational activities:
Type of activities: lecture
Number of hours:
per week: 2 **per level/semester:** 28
Form of the course: on-site learning

Number of credits: 3

Recommended semester: 2.

Educational level: II.

Prerequisites:

Antirequisites: FMFI.KAGDM/2-MPG-136/10

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

Learning outcomes:

Class syllabus:
The students will learn to know new trends in web documents and applications; they will be able to make simple web-documents and programs of simple web-applications, for instance using the languages html, javascript, actionscript, jquery, etc.

Recommended literature:
Flash s využitím XML : tvorba dynamických webových stránek / Craig Swann, Greg Caines ; přeložil Martin Slavík. Praha : Grada, 2003
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: 20

A	B	C	D	E	FX
45,0	5,0	5,0	5,0	15,0	25,0

Lecturers: RNDr. Stanislav Stanek, PhD.

Last change: 03.09.2015

Approved by: prof. RNDr. Július Korbaš, CSc.