

## Course descriptions

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## COURSE DESCRIPTION

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|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------|
| <b>University:</b> Comenius University in Bratislava                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                                                |
| <b>Faculty:</b> Faculty of Mathematics, Physics and Informatics                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                                                |
| <b>Course ID:</b><br>FMFI.KAGDM/2-MPG-104/15                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | <b>Course title:</b><br>Algebraic Geometry (1) |
| <b>Educational activities:</b><br><b>Type of activities:</b> lecture<br><b>Number of hours:</b><br><b>per week:</b> 3 <b>per level/semester:</b> 42<br><b>Form of the course:</b> on-site learning                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                                                |
| <b>Number of credits:</b> 5                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |                                                |
| <b>Recommended semester:</b> 2.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                                                |
| <b>Educational level:</b> II.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                                                |
| <b>Prerequisites:</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |                                                |
| <b>Antirequisites:</b> FMFI.KAGDM/2-MPG-104/00                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |                                                |
| <b>Course requirements:</b><br>Assessment: evaluation<br>Preliminary assessment: continuous evaluation, tests. For attending the exam, the student should have at least 60% of points from the continuous evaluation.<br>Final assessment: Final assessment examination 80% (A 90%; B 80%; C 70%; D 60%; E 50%)<br>Scale of assessment (preliminary/final): 20/80                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                                                |
| <b>Learning outcomes:</b><br>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.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |                                                |
| <b>Class syllabus:</b><br>1. Affine algebraic varieties. Projective completions of affine algebraic varieties.<br>2. Special algebraic curves. (Conic sections, cubic curves – classification and basic properties.)<br>3. Ideals of an algebraic variety. Hilbert basis.<br>4. Correspondence of algebraic varieties and ideals. Hilbert's "zero-locus-theorem" (Nullstellensatz). Gröbner basis of an ideal. Buchberger's algorithm.<br>5. Elimination of zero-dimesional ideal and some applications.<br>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 $k=\mathbb{R}$ or $k=\mathbb{C}$ , Sturm's sequences). Moving lines and moving planes methods.<br>7. Common roots of algebraic equations. Resultant of polynomials in one variable. Newton's polyhedron. |                                                |
| <b>Recommended literature:</b><br>Using algebraic geometry / David A. Cox, John Little, Donal O'Shea. New York : Springer, 2005<br>Computing in algebraic geometry : A quick start using SINGULAR / Wolfram Decker, Christoph Lossen. Berlin : Springer, 2006<br>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. |       |       |       |       |     |
| <b>Languages necessary to complete the course:</b><br>Slovak and English   |       |       |       |       |     |
| <b>Notes:</b>                                                              |       |       |       |       |     |
| <b>Past grade distribution</b><br>Total number of evaluated students: 134  |       |       |       |       |     |
| A                                                                          | B     | C     | D     | E     | FX  |
| 47,01                                                                      | 11,94 | 11,94 | 12,69 | 16,42 | 0,0 |
| <b>Lecturers:</b> doc. RNDr. Eduard Bod'a, CSc.                            |       |       |       |       |     |
| <b>Last change:</b> 03.09.2015                                             |       |       |       |       |     |
| <b>Approved by:</b> prof. RNDr. Július Korbaš, CSc.                        |       |       |       |       |     |

## COURSE DESCRIPTION

|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |     |                                                |     |     |     |
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| <b>University:</b> Comenius University in Bratislava                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |     |                                                |     |     |     |
| <b>Faculty:</b> Faculty of Mathematics, Physics and Informatics                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |     |                                                |     |     |     |
| <b>Course ID:</b><br>FMFI.KAGDM/2-MPG-241/15                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |     | <b>Course title:</b><br>Algebraic Geometry (2) |     |     |     |
| <b>Educational activities:</b><br><b>Type of activities:</b> lecture<br><b>Number of hours:</b><br><b>per week:</b> 2 <b>per level/semester:</b> 28<br><b>Form of the course:</b> on-site learning                                                                                                                                                                                                                                                                                                                                                                                      |     |                                                |     |     |     |
| <b>Number of credits:</b> 3                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |     |                                                |     |     |     |
| <b>Recommended semester:</b> 4.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |     |                                                |     |     |     |
| <b>Educational level:</b> II.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |     |                                                |     |     |     |
| <b>Prerequisites:</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |     |                                                |     |     |     |
| <b>Antirequisites:</b> FMFI.KAGDM/2-MPG-241/00                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |     |                                                |     |     |     |
| <b>Course requirements:</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |     |                                                |     |     |     |
| <b>Learning outcomes:</b><br>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.                                                                                                                                                                                                                                                                                                                                                       |     |                                                |     |     |     |
| <b>Class syllabus:</b><br>Zariski topology. Decomposition of an algebraic variety into irreducible components. Polynomial maps. Rational maps. Tangent space. Tangent cone.<br>Localization – germ of a subvariety.<br>Classification of singularities.<br>Special algebraic varieties: Veronese varieties, Segre varieties, Grassmann varieties and Plücker coordinates, Fano varieties. Determinantal varieties.<br>Sheaves of varieties. High dimensional resultants.<br>Rational parametrization of varieties. Criteria of a parametrization (particularly for curves).<br>Schemes. |     |                                                |     |     |     |
| <b>Recommended literature:</b><br>Algebraic geometry : An introduction / Daniel Perrin ; translated from the French by Catriona Maclean. London : Springer, 2008<br>Electronic texts by the teacher published on the subject website.                                                                                                                                                                                                                                                                                                                                                   |     |                                                |     |     |     |
| <b>Languages necessary to complete the course:</b><br>Slovak and English                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |     |                                                |     |     |     |
| <b>Notes:</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |     |                                                |     |     |     |
| <b>Past grade distribution</b><br>Total number of evaluated students: 3                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |     |                                                |     |     |     |
| A                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | B   | C                                              | D   | E   | FX  |
| 100,0                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | 0,0 | 0,0                                            | 0,0 | 0,0 | 0,0 |

|                                                     |
|-----------------------------------------------------|
| <b>Lecturers:</b> doc. RNDr. Eduard Bod'a, CSc.     |
| <b>Last change:</b> 03.09.2015                      |
| <b>Approved by:</b> prof. RNDr. Július Korbaš, CSc. |

## COURSE DESCRIPTION

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| <b>University:</b> Comenius University in Bratislava                                                                                                                                               |     |                                                        |     |     |     |
| <b>Faculty:</b> Faculty of Mathematics, Physics and Informatics                                                                                                                                    |     |                                                        |     |     |     |
| <b>Course ID:</b><br>FMFL.KAGDM/2-MPG-165/12                                                                                                                                                       |     | <b>Course title:</b><br>Algebraic Geometry Seminar (1) |     |     |     |
| <b>Educational activities:</b><br><b>Type of activities:</b> seminar<br><b>Number of hours:</b><br><b>per week:</b> 2 <b>per level/semester:</b> 28<br><b>Form of the course:</b> on-site learning |     |                                                        |     |     |     |
| <b>Number of credits:</b> 2                                                                                                                                                                        |     |                                                        |     |     |     |
| <b>Recommended semester:</b> 1.                                                                                                                                                                    |     |                                                        |     |     |     |
| <b>Educational level:</b> II.                                                                                                                                                                      |     |                                                        |     |     |     |
| <b>Prerequisites:</b>                                                                                                                                                                              |     |                                                        |     |     |     |
| <b>Course requirements:</b>                                                                                                                                                                        |     |                                                        |     |     |     |
| <b>Learning outcomes:</b>                                                                                                                                                                          |     |                                                        |     |     |     |
| <b>Class syllabus:</b>                                                                                                                                                                             |     |                                                        |     |     |     |
| <b>Recommended literature:</b>                                                                                                                                                                     |     |                                                        |     |     |     |
| <b>Languages necessary to complete the course:</b>                                                                                                                                                 |     |                                                        |     |     |     |
| <b>Notes:</b>                                                                                                                                                                                      |     |                                                        |     |     |     |
| <b>Past grade distribution</b><br>Total number of evaluated students: 2                                                                                                                            |     |                                                        |     |     |     |
| A                                                                                                                                                                                                  | B   | C                                                      | D   | E   | FX  |
| 100,0                                                                                                                                                                                              | 0,0 | 0,0                                                    | 0,0 | 0,0 | 0,0 |
| <b>Lecturers:</b> doc. RNDr. Pavel Chalmovianský, PhD.                                                                                                                                             |     |                                                        |     |     |     |
| <b>Last change:</b> 02.06.2015                                                                                                                                                                     |     |                                                        |     |     |     |
| <b>Approved by:</b> prof. RNDr. Július Korbaš, CSc.                                                                                                                                                |     |                                                        |     |     |     |

## COURSE DESCRIPTION

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| <b>University:</b> Comenius University in Bratislava                                                                                                                                               |     |                                                        |     |     |     |
| <b>Faculty:</b> Faculty of Mathematics, Physics and Informatics                                                                                                                                    |     |                                                        |     |     |     |
| <b>Course ID:</b><br>FMFI.KAGDM/2-MPG-166/12                                                                                                                                                       |     | <b>Course title:</b><br>Algebraic Geometry Seminar (2) |     |     |     |
| <b>Educational activities:</b><br><b>Type of activities:</b> seminar<br><b>Number of hours:</b><br><b>per week:</b> 2 <b>per level/semester:</b> 28<br><b>Form of the course:</b> on-site learning |     |                                                        |     |     |     |
| <b>Number of credits:</b> 2                                                                                                                                                                        |     |                                                        |     |     |     |
| <b>Recommended semester:</b> 2.                                                                                                                                                                    |     |                                                        |     |     |     |
| <b>Educational level:</b> II.                                                                                                                                                                      |     |                                                        |     |     |     |
| <b>Prerequisites:</b>                                                                                                                                                                              |     |                                                        |     |     |     |
| <b>Course requirements:</b>                                                                                                                                                                        |     |                                                        |     |     |     |
| <b>Learning outcomes:</b>                                                                                                                                                                          |     |                                                        |     |     |     |
| <b>Class syllabus:</b>                                                                                                                                                                             |     |                                                        |     |     |     |
| <b>Recommended literature:</b>                                                                                                                                                                     |     |                                                        |     |     |     |
| <b>Languages necessary to complete the course:</b>                                                                                                                                                 |     |                                                        |     |     |     |
| <b>Notes:</b>                                                                                                                                                                                      |     |                                                        |     |     |     |
| <b>Past grade distribution</b><br>Total number of evaluated students: 2                                                                                                                            |     |                                                        |     |     |     |
| A                                                                                                                                                                                                  | B   | C                                                      | D   | E   | FX  |
| 100,0                                                                                                                                                                                              | 0,0 | 0,0                                                    | 0,0 | 0,0 | 0,0 |
| <b>Lecturers:</b> doc. RNDr. Pavel Chalmovianský, PhD., doc. RNDr. Eduard Bod'a, CSc.                                                                                                              |     |                                                        |     |     |     |
| <b>Last change:</b> 02.06.2015                                                                                                                                                                     |     |                                                        |     |     |     |
| <b>Approved by:</b> prof. RNDr. Július Korbaš, CSc.                                                                                                                                                |     |                                                        |     |     |     |

## COURSE DESCRIPTION

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| <b>University:</b> Comenius University in Bratislava                                                                                                                                                                                                                                                                             |       |                                                        |       |       |     |
| <b>Faculty:</b> Faculty of Mathematics, Physics and Informatics                                                                                                                                                                                                                                                                  |       |                                                        |       |       |     |
| <b>Course ID:</b><br>FMFI.KI/2-MPG-106/00                                                                                                                                                                                                                                                                                        |       | <b>Course title:</b><br>Algorithms and Data Structures |       |       |     |
| <b>Educational activities:</b><br><b>Type of activities:</b> lecture / practicals<br><b>Number of hours:</b><br><b>per week:</b> 2 / 1 <b>per level/semester:</b> 28 / 14<br><b>Form of the course:</b> on-site learning                                                                                                         |       |                                                        |       |       |     |
| <b>Number of credits:</b> 4                                                                                                                                                                                                                                                                                                      |       |                                                        |       |       |     |
| <b>Recommended semester:</b> 1.                                                                                                                                                                                                                                                                                                  |       |                                                        |       |       |     |
| <b>Educational level:</b> II.                                                                                                                                                                                                                                                                                                    |       |                                                        |       |       |     |
| <b>Prerequisites:</b>                                                                                                                                                                                                                                                                                                            |       |                                                        |       |       |     |
| <b>Course requirements:</b><br>Scale of assessment (preliminary/final): 40/60                                                                                                                                                                                                                                                    |       |                                                        |       |       |     |
| <b>Learning outcomes:</b>                                                                                                                                                                                                                                                                                                        |       |                                                        |       |       |     |
| <b>Class syllabus:</b><br>An introduction into problem area.<br>Mathematical foundations (asymptotic notation, standard notations and common functions).<br>Analysis of algorithms (heapsort, quicksort, sorting in linear time).<br>Data structures (elementary data structures, hashing tables, binary tries, balanced tries). |       |                                                        |       |       |     |
| <b>Recommended literature:</b><br>Aho, Hopcroft, Ullman: The design and analysis of computer algorithms, Adison Wesley 1974.<br>Niklaus Wirth: Algoritmy a štruktúry údajov, Alfa 1987.<br>Cormen, Leiserson, Rivest: Introduction to Algorithms, MIT Press 1990.                                                                |       |                                                        |       |       |     |
| <b>Languages necessary to complete the course:</b>                                                                                                                                                                                                                                                                               |       |                                                        |       |       |     |
| <b>Notes:</b>                                                                                                                                                                                                                                                                                                                    |       |                                                        |       |       |     |
| <b>Past grade distribution</b><br>Total number of evaluated students: 143                                                                                                                                                                                                                                                        |       |                                                        |       |       |     |
| A                                                                                                                                                                                                                                                                                                                                | B     | C                                                      | D     | E     | FX  |
| 17,48                                                                                                                                                                                                                                                                                                                            | 16,08 | 16,78                                                  | 19,58 | 29,37 | 0,7 |
| <b>Lecturers:</b> RNDr. Peter Kostolányi, PhD., doc. RNDr. Dana Pardubská, CSc.                                                                                                                                                                                                                                                  |       |                                                        |       |       |     |
| <b>Last change:</b> 02.09.2015                                                                                                                                                                                                                                                                                                   |       |                                                        |       |       |     |
| <b>Approved by:</b> prof. RNDr. Július Korbaš, CSc.                                                                                                                                                                                                                                                                              |       |                                                        |       |       |     |

## COURSE DESCRIPTION

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| <b>University:</b> Comenius University in Bratislava                                                                                                                                                                                                                                                                                                                                                          |       |                                                                |      |      |     |
| <b>Faculty:</b> Faculty of Mathematics, Physics and Informatics                                                                                                                                                                                                                                                                                                                                               |       |                                                                |      |      |     |
| <b>Course ID:</b><br>FMFI.KMANM/2-MPG-113/15                                                                                                                                                                                                                                                                                                                                                                  |       | <b>Course title:</b><br>Approximation and Interpolation Theory |      |      |     |
| <b>Educational activities:</b><br><b>Type of activities:</b> course<br><b>Number of hours:</b><br><b>per week:</b> 2 <b>per level/semester:</b> 28<br><b>Form of the course:</b> on-site learning                                                                                                                                                                                                             |       |                                                                |      |      |     |
| <b>Number of credits:</b> 3                                                                                                                                                                                                                                                                                                                                                                                   |       |                                                                |      |      |     |
| <b>Recommended semester:</b> 3.                                                                                                                                                                                                                                                                                                                                                                               |       |                                                                |      |      |     |
| <b>Educational level:</b> II.                                                                                                                                                                                                                                                                                                                                                                                 |       |                                                                |      |      |     |
| <b>Prerequisites:</b>                                                                                                                                                                                                                                                                                                                                                                                         |       |                                                                |      |      |     |
| <b>Antirequisites:</b> FMFI.KMANM/2-MPG-113/00                                                                                                                                                                                                                                                                                                                                                                |       |                                                                |      |      |     |
| <b>Course requirements:</b><br>Preliminary assessment: continuous assessment, tests 100%<br>Final assessment: Final evaluation examination 0% (A 90%; B 80%; C 70%; D 60%; E 50%)<br>Scale of assessment (preliminary/final): 100/0                                                                                                                                                                           |       |                                                                |      |      |     |
| <b>Learning outcomes:</b><br>The students obtain an overview of the results used in approximations and interpolations of functions of one real variable.                                                                                                                                                                                                                                                      |       |                                                                |      |      |     |
| <b>Class syllabus:</b><br>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.                        |       |                                                                |      |      |     |
| <b>Recommended literature:</b><br>Teorie aproximací / N. I. Achijezer. Praha : Nakladatelství Československé akademie věd, 1955<br>Aproximacia funkcí / Arnold Dávid, Ľudomír Šlahor. Bratislava : Univerzita Komenského, 1978<br>Aproximačné a kvadrátúrne metódy / Adela Fillová, Anna Valková. Bratislava : MFF UK, 1986<br>Electronics materials of the lecturer published on the web page of the course. |       |                                                                |      |      |     |
| <b>Languages necessary to complete the course:</b><br>Slovak and English                                                                                                                                                                                                                                                                                                                                      |       |                                                                |      |      |     |
| <b>Notes:</b>                                                                                                                                                                                                                                                                                                                                                                                                 |       |                                                                |      |      |     |
| <b>Past grade distribution</b><br>Total number of evaluated students: 94                                                                                                                                                                                                                                                                                                                                      |       |                                                                |      |      |     |
| A                                                                                                                                                                                                                                                                                                                                                                                                             | B     | C                                                              | D    | E    | FX  |
| 48,94                                                                                                                                                                                                                                                                                                                                                                                                         | 19,15 | 20,21                                                          | 7,45 | 4,26 | 0,0 |
| <b>Lecturers:</b> Mgr. Jela Babušíková, PhD.                                                                                                                                                                                                                                                                                                                                                                  |       |                                                                |      |      |     |

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| <b>Last change:</b> 03.09.2015                      |
| <b>Approved by:</b> prof. RNDr. Július Korbaš, CSc. |

## COURSE DESCRIPTION

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|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------|
| <b>University:</b> Comenius University in Bratislava                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |                                     |
| <b>Faculty:</b> Faculty of Mathematics, Physics and Informatics                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |                                     |
| <b>Course ID:</b><br>FMFI.KAGDM/2-MPG-150/15                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | <b>Course title:</b><br>CAD Systems |
| <b>Educational activities:</b><br><b>Type of activities:</b> course<br><b>Number of hours:</b><br><b>per week:</b> 2 <b>per level/semester:</b> 28<br><b>Form of the course:</b> on-site learning                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                                     |
| <b>Number of credits:</b> 3                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |                                     |
| <b>Recommended semester:</b> 2.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |                                     |
| <b>Educational level:</b> II.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |                                     |
| <b>Prerequisites:</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                                     |
| <b>Antirequisites:</b> FMFI.KAGDM/2-MPG-150/00                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                                     |
| <b>Course requirements:</b><br>Final assessment exam 0% (A 90%; B 80%; C 70%; D 60%; E 50%)<br>Scale of assessment (preliminary/final): 100/0                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |                                     |
| <b>Learning outcomes:</b><br>After completing the course, students will be able to work with CAD systems: LibreCAD, SketchUp, SweetHome 3D and FreeCAD at the intermediate level.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                                     |
| <b>Class syllabus:</b> <ol style="list-style-type: none"> <li>1. Drawing basic shapes in LibreCAD (line segments, rectangles, arcs and polygons).</li> <li>2. Dimensioning, hatching, blocks creating and manipulation with blocks, work with layers.</li> <li>3. More advanced functions of LibreCAD – trimming, arcs and lines connecting, work with text, dimensioning marks adjusting, etc.</li> <li>4. Basics of work in SketchUp. Layout description, environment adjusting (toolbar, layout). Push and move tools usage. Creating simple basic objects.</li> <li>5. Usage of further tools of SketchUp.</li> <li>6. Interesting SketchUp plugins overview.</li> <li>7. Basics of work in Sweet Home 3D (creating walls, rooms, adding and placing of furniture; adjustment of colours and sizes).</li> <li>8. Sweet Home extensions, adjustment of texts, skew walls creating, work with lights, adjusting colours, import of own models and new objects.</li> <li>9. Basics work in FreeCAD. Layout description, creating simple objects.</li> </ol> |                                     |
| <b>Recommended literature:</b><br>AutoCad Release 12 : Průvodce příkazy a funkcemi : Popis příkazů a funkcí s rozlišením verzí 10, 11 a 12 / Jiří Hlavenka. Brno : CCB, 1992<br>CAD systémy / Róbert Bohdal. <a href="http://flurry.dg.fmph.uniba.sk/webog/sk/bohdal-vyucba/85-aut-int-proj.html">http://flurry.dg.fmph.uniba.sk/webog/sk/bohdal-vyucba/85-aut-int-proj.html</a>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                                     |
| <b>Languages necessary to complete the course:</b><br>Slovak and English                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |                                     |

|                                                     |       |       |      |      |     |
|-----------------------------------------------------|-------|-------|------|------|-----|
| <b>Notes:</b>                                       |       |       |      |      |     |
| <b>Past grade distribution</b>                      |       |       |      |      |     |
| Total number of evaluated students: 75              |       |       |      |      |     |
| A                                                   | B     | C     | D    | E    | FX  |
| 66,67                                               | 14,67 | 13,33 | 2,67 | 2,67 | 0,0 |
| <b>Lecturers:</b> RNDr. Róbert Bohdal, PhD.         |       |       |      |      |     |
| <b>Last change:</b> 03.09.2015                      |       |       |      |      |     |
| <b>Approved by:</b> prof. RNDr. Július Korbaš, CSc. |       |       |      |      |     |

## COURSE DESCRIPTION

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| <b>University:</b> Comenius University in Bratislava                                                                                                                                                                                                                                                                                                                                                                                            |                                                 |
| <b>Faculty:</b> Faculty of Mathematics, Physics and Informatics                                                                                                                                                                                                                                                                                                                                                                                 |                                                 |
| <b>Course ID:</b><br>FMFI.KAI/2-MPG-246/15                                                                                                                                                                                                                                                                                                                                                                                                      | <b>Course title:</b><br>Colour Image Processing |
| <b>Educational activities:</b><br><b>Type of activities:</b> lecture / practicals<br><b>Number of hours:</b><br><b>per week:</b> 2 / 2 <b>per level/semester:</b> 28 / 28<br><b>Form of the course:</b> on-site learning                                                                                                                                                                                                                        |                                                 |
| <b>Number of credits:</b> 6                                                                                                                                                                                                                                                                                                                                                                                                                     |                                                 |
| <b>Recommended semester:</b> 4.                                                                                                                                                                                                                                                                                                                                                                                                                 |                                                 |
| <b>Educational level:</b> II.                                                                                                                                                                                                                                                                                                                                                                                                                   |                                                 |
| <b>Prerequisites:</b>                                                                                                                                                                                                                                                                                                                                                                                                                           |                                                 |
| <b>Antirequisites:</b> FMFI.KAI/2-AIN-273/11                                                                                                                                                                                                                                                                                                                                                                                                    |                                                 |
| <b>Course requirements:</b><br>E at least 50%                                                                                                                                                                                                                                                                                                                                                                                                   |                                                 |
| <b>Learning outcomes:</b><br>After completing the subject, the student will master advanced techniques of the colour-image processing.                                                                                                                                                                                                                                                                                                          |                                                 |
| <b>Class syllabus:</b><br>Light and colour, the human visual system.<br>Colour image quantization, determination of the palette.<br>Colour morphology.<br>Finding of corners, filtering of colour images.<br>Segmentation and its use.<br>Colour -to-grayscale and vice versa conversions.<br>Colour stability, shadow removal.<br>Mapping of the colour range.<br>Colour models.                                                               |                                                 |
| <b>Recommended literature:</b><br>Color in computer vision : Fundamentals and applications / Theo Gevers ... [et al.]. Hoboken : Wiley, 2012<br>Digital color image processing / Andreas Koschan, Mongi Abidi. Hoboken, N.J. : Wiley, 2008<br>Elena Šikudová, Zuzana Černeková, Vanda Benešová, Zuzana Haladová, Júlia Kučerová:<br>Počítačové videnie. Detekcia a rozpoznávanie objektov, vydavateľstvo Wikina, Praha, ISBN: 978-80-87925-06-5 |                                                 |
| <b>Languages necessary to complete the course:</b><br>Slovak and English                                                                                                                                                                                                                                                                                                                                                                        |                                                 |
| <b>Notes:</b>                                                                                                                                                                                                                                                                                                                                                                                                                                   |                                                 |

|                                                     |     |     |     |     |     |
|-----------------------------------------------------|-----|-----|-----|-----|-----|
| <b>Past grade distribution</b>                      |     |     |     |     |     |
| Total number of evaluated students: 0               |     |     |     |     |     |
| A                                                   | B   | C   | D   | E   | FX  |
| 0,0                                                 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 |
| <b>Lecturers:</b> RNDr. Zuzana Černeková, PhD.      |     |     |     |     |     |
| <b>Last change:</b> 03.09.2015                      |     |     |     |     |     |
| <b>Approved by:</b> prof. RNDr. Július Korbaš, CSc. |     |     |     |     |     |

## COURSE DESCRIPTION

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|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------|
| <b>University:</b> Comenius University in Bratislava                                                                                                                                                                                                                                                                                                                                                                   |                                           |
| <b>Faculty:</b> Faculty of Mathematics, Physics and Informatics                                                                                                                                                                                                                                                                                                                                                        |                                           |
| <b>Course ID:</b><br>FMFI.KAGDM/2-MPG-218/15                                                                                                                                                                                                                                                                                                                                                                           | <b>Course title:</b><br>Complexity Theory |
| <b>Educational activities:</b><br><b>Type of activities:</b> lecture<br><b>Number of hours:</b><br><b>per week:</b> 3 <b>per level/semester:</b> 42<br><b>Form of the course:</b> on-site learning                                                                                                                                                                                                                     |                                           |
| <b>Number of credits:</b> 5                                                                                                                                                                                                                                                                                                                                                                                            |                                           |
| <b>Recommended semester:</b> 4.                                                                                                                                                                                                                                                                                                                                                                                        |                                           |
| <b>Educational level:</b> II.                                                                                                                                                                                                                                                                                                                                                                                          |                                           |
| <b>Prerequisites:</b>                                                                                                                                                                                                                                                                                                                                                                                                  |                                           |
| <b>Antirequisites:</b> FMFI.KI/2-AIN-106/00                                                                                                                                                                                                                                                                                                                                                                            |                                           |
| <b>Course requirements:</b><br>Assessment: evaluation<br>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.<br>Final assessment: 50% Final evaluation examination (written, oral)<br>Scale of assessment (preliminary/final): 50/50                                        |                                           |
| <b>Learning outcomes:</b><br>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.                                                                  |                                           |
| <b>Class syllabus:</b><br>- Problems and algorithms. Basic computational models and complexity measures.<br>- Complexity classes, their fundamental characteristics and hierarchies.<br>- Reduction and completeness in the complexity classes. NP-complete problems.<br>- Methods of solving (computationally) hard problems – deterministic methods, heuristics, approximation algorithms, probabilistic algorithms. |                                           |
| <b>Recommended literature:</b><br>Zložitost' geometrických algoritmov / Pavel Chalmovianský, Andrej Ferko, Roman Galbavý. Bratislava : Univerzita Komenského, 2001<br>Algorithmics for hard problems : Introduction to combinatorial optimization, randomization, approximation, and heuristics / Juraj Hromkovič. Berlin : Springer, 2003<br>Approximation algorithms / Vijay V. Vazirani. Berlin : Springer, 2001    |                                           |
| <b>Languages necessary to complete the course:</b><br>Slovak and English                                                                                                                                                                                                                                                                                                                                               |                                           |
| <b>Notes:</b>                                                                                                                                                                                                                                                                                                                                                                                                          |                                           |

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|-----------------------------------------------------|-----|-----|-----|-----|-----|
| <b>Past grade distribution</b>                      |     |     |     |     |     |
| Total number of evaluated students: 0               |     |     |     |     |     |
| A                                                   | B   | C   | D   | E   | FX  |
| 0,0                                                 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 |
| <b>Lecturers:</b> doc. RNDr. Dana Pardubská, CSc.   |     |     |     |     |     |
| <b>Last change:</b> 03.09.2015                      |     |     |     |     |     |
| <b>Approved by:</b> prof. RNDr. Július Korbaš, CSc. |     |     |     |     |     |

## COURSE DESCRIPTION

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| <b>University:</b> Comenius University in Bratislava                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |                                                |
| <b>Faculty:</b> Faculty of Mathematics, Physics and Informatics                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                                                |
| <b>Course ID:</b><br>FMFI.KAGDM/2-MPG-203/00                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | <b>Course title:</b><br>Computational Geometry |
| <b>Educational activities:</b><br><b>Type of activities:</b> course<br><b>Number of hours:</b><br><b>per week:</b> 4 <b>per level/semester:</b> 56<br><b>Form of the course:</b> on-site learning                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |                                                |
| <b>Number of credits:</b> 5                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                                                |
| <b>Recommended semester:</b> 3.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                                                |
| <b>Educational level:</b> II.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                                                |
| <b>Prerequisites:</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |                                                |
| <b>Course requirements:</b><br>Assessment: evaluation<br>Preliminary assessment: paper<br>Final assessment: 60% Final evaluation examination (oral)<br>A 90%, B 80%, C 70%, D 60%, E 50%<br>Scale of assessment (preliminary/final): 40/60                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                                                |
| <b>Learning outcomes:</b><br>To acquaint the students with basic problems of computational geometry and their effective solutions.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |                                                |
| <b>Class syllabus:</b><br>Basic data structures of computational geometry.<br>Geometric searching.<br>Constructions of convex hull of finite set of points and modifications.<br>Proximity problems. Triangulations.<br>Intersection of polygons and polyhedra.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                                                |
| <b>Recommended literature:</b><br>Zložitosť geometrických algoritmov / Pavel Chalmovianský, Andrej Ferko, Roman Galbavý. Bratislava : Univerzita Komenského, 2001<br>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).<br>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). |                                                |
| <b>Languages necessary to complete the course:</b><br>Slovak and English                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                                                |
| <b>Notes:</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                                                |

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|--------------------------------------------------------|-------|-------|-------|-------|-------|
| <b>Past grade distribution</b>                         |       |       |       |       |       |
| Total number of evaluated students: 139                |       |       |       |       |       |
| A                                                      | B     | C     | D     | E     | FX    |
| 28,78                                                  | 10,79 | 15,83 | 13,67 | 12,95 | 17,99 |
| <b>Lecturers:</b> doc. RNDr. Pavel Chalmovianský, PhD. |       |       |       |       |       |
| <b>Last change:</b> 03.09.2015                         |       |       |       |       |       |
| <b>Approved by:</b> prof. RNDr. Július Korbaš, CSc.    |       |       |       |       |       |

## COURSE DESCRIPTION

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| <b>University:</b> Comenius University in Bratislava                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |      |                                                        |      |      |      |
| <b>Faculty:</b> Faculty of Mathematics, Physics and Informatics                                                                                                                                                                                                                                                                                                                                                                                                                                                                |      |                                                        |      |      |      |
| <b>Course ID:</b><br>FMFI.KAGDM/2-MPG-142/00                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |      | <b>Course title:</b><br>Computer Constructive Geometry |      |      |      |
| <b>Educational activities:</b><br><b>Type of activities:</b> lecture<br><b>Number of hours:</b><br><b>per week:</b> 2 <b>per level/semester:</b> 28<br><b>Form of the course:</b> on-site learning                                                                                                                                                                                                                                                                                                                             |      |                                                        |      |      |      |
| <b>Number of credits:</b> 3                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |      |                                                        |      |      |      |
| <b>Recommended semester:</b> 1.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |      |                                                        |      |      |      |
| <b>Educational level:</b> II.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |      |                                                        |      |      |      |
| <b>Prerequisites:</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |      |                                                        |      |      |      |
| <b>Course requirements:</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |      |                                                        |      |      |      |
| <b>Learning outcomes:</b><br>To become familiar with methods of parallel and central projections. Algorithmic access to construction and description of geometric objects by methods of analytic geometry.                                                                                                                                                                                                                                                                                                                     |      |                                                        |      |      |      |
| <b>Class syllabus:</b><br>1. Fundamental principles of parallel projection, affine transformations, perspective affinity.<br>2. Hierarchy of methods of parallel projection – orthogonal (Monge, axonometry), oblique (basic, degenerative axonometry).<br>3. Analytic access to methods of parallel projection to display the surfaces (of revolution, helical surfaces, translational surfaces).<br>4. Central projection, linear perspective projection, principle of stereo images, analytic access to central projection. |      |                                                        |      |      |      |
| <b>Recommended literature:</b><br>Konštruktívna geometria pre technikov / Václav Medek, Jozef Zámožík. Bratislava : Alfa, 1978<br>Osobný počítač a geometria / Václav Medek, Jozef Zámožík. Bratislava : Alfa, 1991<br>Základy počítačovej grafiky / Jozef Zámožík, Edita Vranková, Mária Mišútová, Iveta Markechová,STU Bratislava,1999<br>Zobrazovací metódy I, II / Emil Kraemer, SPN Praha, 1991<br>Electronic texts by the teacher, published on the WWW page of the subject.                                             |      |                                                        |      |      |      |
| <b>Languages necessary to complete the course:</b><br>Slovak and English                                                                                                                                                                                                                                                                                                                                                                                                                                                       |      |                                                        |      |      |      |
| <b>Notes:</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |      |                                                        |      |      |      |
| <b>Past grade distribution</b><br>Total number of evaluated students: 66                                                                                                                                                                                                                                                                                                                                                                                                                                                       |      |                                                        |      |      |      |
| A                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | B    | C                                                      | D    | E    | FX   |
| 39,39                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | 19,7 | 28,79                                                  | 6,06 | 4,55 | 1,52 |

|                                                     |
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| <b>Lecturers:</b> RNDr. Soňa Kudličková, CSc.       |
| <b>Last change:</b> 02.09.2015                      |
| <b>Approved by:</b> prof. RNDr. Július Korbaš, CSc. |

## STATE EXAM DESCRIPTION

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| <b>University:</b> Comenius University in Bratislava                                                                                                                                                                                                                                                                                                            |                                           |
| <b>Faculty:</b> Faculty of Mathematics, Physics and Informatics                                                                                                                                                                                                                                                                                                 |                                           |
| <b>Course ID:</b><br>FMFI.KAGDM/2-MPG-952/15                                                                                                                                                                                                                                                                                                                    | <b>Course title:</b><br>Computer Graphics |
| <b>Number of credits:</b> 6                                                                                                                                                                                                                                                                                                                                     |                                           |
| <b>Educational level:</b> II.                                                                                                                                                                                                                                                                                                                                   |                                           |
| <b>Course requirements:</b><br>Assessment: State Examination<br>Preliminary assessment: 0%<br>Final assessment: 100%<br>A 90%, B 80%, C 70%, D 60%, E 50%<br>Scale of assessment (preliminary/final): 100/0                                                                                                                                                     |                                           |
| <b>Learning outcomes:</b><br>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.                                                                                  |                                           |
| <b>Class syllabus:</b><br>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.<br>The students answer questions from the subjects that they have completed. |                                           |
| <b>State exam syllabus:</b>                                                                                                                                                                                                                                                                                                                                     |                                           |
| <b>Languages necessary to complete the course:</b><br>Slovak and English                                                                                                                                                                                                                                                                                        |                                           |
| <b>Last change:</b> 03.09.2015                                                                                                                                                                                                                                                                                                                                  |                                           |
| <b>Approved by:</b> prof. RNDr. Július Korbaš, CSc.                                                                                                                                                                                                                                                                                                             |                                           |

## COURSE DESCRIPTION

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| <b>University:</b> Comenius University in Bratislava                                                                                                                                                                                                                                                                                                                                                                                                                                                |       |                                               |       |       |       |
| <b>Faculty:</b> Faculty of Mathematics, Physics and Informatics                                                                                                                                                                                                                                                                                                                                                                                                                                     |       |                                               |       |       |       |
| <b>Course ID:</b><br>FMFI.KAGDM/2-MPG-101/00                                                                                                                                                                                                                                                                                                                                                                                                                                                        |       | <b>Course title:</b><br>Computer Graphics (1) |       |       |       |
| <b>Educational activities:</b><br><b>Type of activities:</b> lecture / practicals<br><b>Number of hours:</b><br><b>per week:</b> 2 / 2 <b>per level/semester:</b> 28 / 28<br><b>Form of the course:</b> on-site learning                                                                                                                                                                                                                                                                            |       |                                               |       |       |       |
| <b>Number of credits:</b> 5                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |       |                                               |       |       |       |
| <b>Recommended semester:</b> 1.                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |       |                                               |       |       |       |
| <b>Educational level:</b> II.                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |       |                                               |       |       |       |
| <b>Prerequisites:</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |       |                                               |       |       |       |
| <b>Course requirements:</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |       |                                               |       |       |       |
| <b>Learning outcomes:</b><br>To provide students with fundamental techniques in computer graphics.                                                                                                                                                                                                                                                                                                                                                                                                  |       |                                               |       |       |       |
| <b>Class syllabus:</b><br>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. |       |                                               |       |       |       |
| <b>Recommended literature:</b><br>E. Ružický, Úvod do počítačovej grafiky, skriptá, MFF UK Bratislava, 1991<br>J. Žára et al., Počítačová grafika, princípy a algoritmy, Grada, Praha 1992<br>E. Ružický, A. Ferko, Počítačová grafika a spracovanie obrazu, Sapientia, Bratislava 1995<br>J. Žára, et al. Moderní počítačová grafika, Computer Press, Praha 2004                                                                                                                                   |       |                                               |       |       |       |
| <b>Languages necessary to complete the course:</b><br>Slovak and English                                                                                                                                                                                                                                                                                                                                                                                                                            |       |                                               |       |       |       |
| <b>Notes:</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |       |                                               |       |       |       |
| <b>Past grade distribution</b><br>Total number of evaluated students: 575                                                                                                                                                                                                                                                                                                                                                                                                                           |       |                                               |       |       |       |
| A                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | B     | C                                             | D     | E     | FX    |
| 14,09                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | 13,39 | 16,17                                         | 20,87 | 22,26 | 13,22 |
| <b>Lecturers:</b> RNDr. Martina Bátorová, PhD.                                                                                                                                                                                                                                                                                                                                                                                                                                                      |       |                                               |       |       |       |
| <b>Last change:</b> 16.09.2015                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |       |                                               |       |       |       |
| <b>Approved by:</b> prof. RNDr. Július Korbaš, CSc.                                                                                                                                                                                                                                                                                                                                                                                                                                                 |       |                                               |       |       |       |

## COURSE DESCRIPTION

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| <b>University:</b> Comenius University in Bratislava                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |       |                                               |       |       |      |
| <b>Faculty:</b> Faculty of Mathematics, Physics and Informatics                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |       |                                               |       |       |      |
| <b>Course ID:</b><br>FMFI.KAGDM/2-MPG-102/00                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |       | <b>Course title:</b><br>Computer Graphics (2) |       |       |      |
| <b>Educational activities:</b><br><b>Type of activities:</b> lecture / practicals<br><b>Number of hours:</b><br><b>per week:</b> 2 / 2 <b>per level/semester:</b> 28 / 28<br><b>Form of the course:</b> on-site learning                                                                                                                                                                                                                                                                                                                                                                                                             |       |                                               |       |       |      |
| <b>Number of credits:</b> 5                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |       |                                               |       |       |      |
| <b>Recommended semester:</b> 2.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |       |                                               |       |       |      |
| <b>Educational level:</b> II.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |       |                                               |       |       |      |
| <b>Prerequisites:</b> FMFI.KAGDM/2-MPG-101/00 - Computer Graphics (1)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |       |                                               |       |       |      |
| <b>Course requirements:</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |       |                                               |       |       |      |
| <b>Learning outcomes:</b><br>To provide students with the knowledge of advanced techniques for photorealistic computer graphics.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |       |                                               |       |       |      |
| <b>Class syllabus:</b><br>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. |       |                                               |       |       |      |
| <b>Recommended literature:</b><br>Moderní počítačová grafika / Jiří Žára ... [et al.]. Brno : Computer Press, 2010<br>Matematická analýza 3 : Integrálny počet v $R^n$ / Vladimír Ďurikovič, Roman Ďurikovič. Trnava : Univerzita sv. Cyrila a Metoda, 2008<br>Electronic texts by the teacher, published on the WWW page of the class.                                                                                                                                                                                                                                                                                              |       |                                               |       |       |      |
| <b>Languages necessary to complete the course:</b><br>Slovak and English                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |       |                                               |       |       |      |
| <b>Notes:</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |       |                                               |       |       |      |
| <b>Past grade distribution</b><br>Total number of evaluated students: 263                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |       |                                               |       |       |      |
| A                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | B     | C                                             | D     | E     | FX   |
| 14,83                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | 19,01 | 23,95                                         | 17,87 | 16,35 | 7,98 |
| <b>Lecturers:</b> RNDr. Róbert Bohdal, PhD.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |       |                                               |       |       |      |
| <b>Last change:</b> 02.09.2015                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |       |                                               |       |       |      |

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

## COURSE DESCRIPTION

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| <b>University:</b> Comenius University in Bratislava                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                                               |
| <b>Faculty:</b> Faculty of Mathematics, Physics and Informatics                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                                               |
| <b>Course ID:</b><br>FMFI.KAGDM/2-MPG-201/15                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | <b>Course title:</b><br>Computer Graphics (3) |
| <b>Educational activities:</b><br><b>Type of activities:</b> lecture / practicals<br><b>Number of hours:</b><br><b>per week:</b> 2 / 1 <b>per level/semester:</b> 28 / 14<br><b>Form of the course:</b> on-site learning                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |                                               |
| <b>Number of credits:</b> 4                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |                                               |
| <b>Recommended semester:</b> 3.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                                               |
| <b>Educational level:</b> II.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |                                               |
| <b>Prerequisites:</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |                                               |
| <b>Course requirements:</b><br>Preliminary assessment: continuous assessment, projects; for final examination there is required at least 50% of points from the continuous assessment.<br>Final assessment: 60% Final evaluation examination<br>Scale of assessment (preliminary/final): 40/60                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |                                               |
| <b>Learning outcomes:</b><br>Advanced modeling and rendering methods and their applications to multidimensional data presentations.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                                               |
| <b>Class syllabus:</b><br>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.<br>Computer animation (Szirmay-Kalos). Animation languages and procedural animation. Animating articulated structures: forward and inverse kinematics. Key-frame animation.<br>Geometry processing, special triangulations and levels of detail.<br>Textures for rendering, object movies and cultural heritage digitization. Visualizing of multidimensional data.                                                                                                                                                                                                                                                  |                                               |
| <b>Recommended literature:</b><br>Szirmay-Kalos, L. Theory of 3D Computer Graphics. Akademiai Kiado 1995. PDF online at <a href="http://sirkan.iit.bme.hu/~szirmay/book.html">http://sirkan.iit.bme.hu/~szirmay/book.html</a><br>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.)<br>Spatial Augmented Reality - Merging Real and Virtual Worlds / Bimber O., Raskar R. , A K Peters, 2005, PDF online at the class web page.<br>Počítačová grafika a spracovanie obrazu / Eugen Ružický, Andrej Ferko. Bratislava : Sapientia, 1995<br>Moderní počítačová grafika / Jiří Žára, Bedřich Beneš, Petr Felkel. Praha : Computer Press, 1998<br>Digital study materials by the lecturer, published online at the class web page. |                                               |

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| <b>Languages necessary to complete the course:</b><br>Slovak and English        |       |       |      |      |       |
| <b>Notes:</b>                                                                   |       |       |      |      |       |
| <b>Past grade distribution</b><br>Total number of evaluated students: 138       |       |       |      |      |       |
| A                                                                               | B     | C     | D    | E    | FX    |
| 36,23                                                                           | 29,71 | 14,49 | 7,97 | 1,45 | 10,14 |
| <b>Lecturers:</b> doc. RNDr. Andrej Ferko, PhD., RNDr. Miroslava Valíková, PhD. |       |       |      |      |       |
| <b>Last change:</b> 03.09.2015                                                  |       |       |      |      |       |
| <b>Approved by:</b> prof. RNDr. Július Korbaš, CSc.                             |       |       |      |      |       |

## COURSE DESCRIPTION

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| <b>University:</b> Comenius University in Bratislava                                                                                                                                                                                |       |                                                        |      |      |      |
| <b>Faculty:</b> Faculty of Mathematics, Physics and Informatics                                                                                                                                                                     |       |                                                        |      |      |      |
| <b>Course ID:</b><br>FMFI.KAI/2-AIN-222/00                                                                                                                                                                                          |       | <b>Course title:</b><br>Computer Graphics Applications |      |      |      |
| <b>Educational activities:</b><br><b>Type of activities:</b> seminar<br><b>Number of hours:</b><br><b>per week:</b> 2 <b>per level/semester:</b> 28<br><b>Form of the course:</b> on-site learning                                  |       |                                                        |      |      |      |
| <b>Number of credits:</b> 3                                                                                                                                                                                                         |       |                                                        |      |      |      |
| <b>Recommended semester:</b> 1.                                                                                                                                                                                                     |       |                                                        |      |      |      |
| <b>Educational level:</b> II.                                                                                                                                                                                                       |       |                                                        |      |      |      |
| <b>Prerequisites:</b>                                                                                                                                                                                                               |       |                                                        |      |      |      |
| <b>Course requirements:</b><br>presentations, quiz<br>A 92%, B 84%, C 76%, D 68%, E 60<br>Scale of assessment (preliminary/final): 100/0                                                                                            |       |                                                        |      |      |      |
| <b>Learning outcomes:</b><br>Students will have knowledge of successful design projects and new trends in the application of methods and means of computer graphics.                                                                |       |                                                        |      |      |      |
| <b>Class syllabus:</b><br>1. Project presentations according to the project report distributed to the students<br>2. Projects and results done at the department<br>3. New trends and applications of computer graphics techniques. |       |                                                        |      |      |      |
| <b>Recommended literature:</b><br>J. Žára, B. Beneš, P. Felkel, Moderní počítačová grafika, Computer Press, Praha 1998<br>Project report in journal IEEE Computer and Graphics Applications<br>Internet                             |       |                                                        |      |      |      |
| <b>Languages necessary to complete the course:</b>                                                                                                                                                                                  |       |                                                        |      |      |      |
| <b>Notes:</b>                                                                                                                                                                                                                       |       |                                                        |      |      |      |
| <b>Past grade distribution</b><br>Total number of evaluated students: 166                                                                                                                                                           |       |                                                        |      |      |      |
| A                                                                                                                                                                                                                                   | B     | C                                                      | D    | E    | FX   |
| 53,01                                                                                                                                                                                                                               | 13,86 | 17,47                                                  | 6,63 | 5,42 | 3,61 |
| <b>Lecturers:</b> prof. RNDr. Roman Ďurikovič, PhD.                                                                                                                                                                                 |       |                                                        |      |      |      |
| <b>Last change:</b> 22.09.2017                                                                                                                                                                                                      |       |                                                        |      |      |      |
| <b>Approved by:</b> prof. RNDr. Július Korbaš, CSc.                                                                                                                                                                                 |       |                                                        |      |      |      |

## COURSE DESCRIPTION

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| <b>University:</b> Comenius University in Bratislava                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                                         |
| <b>Faculty:</b> Faculty of Mathematics, Physics and Informatics                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                                         |
| <b>Course ID:</b><br>FMFI.KAI+KAGDM/2-MPG-125/15                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | <b>Course title:</b><br>Computer Vision |
| <b>Educational activities:</b><br><b>Type of activities:</b> lecture / practicals<br><b>Number of hours:</b><br><b>per week:</b> 2 / 2 <b>per level/semester:</b> 28 / 28<br><b>Form of the course:</b> on-site learning                                                                                                                                                                                                                                                                                                                                                                                      |                                         |
| <b>Number of credits:</b> 6                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |                                         |
| <b>Recommended semester:</b> 1.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                                         |
| <b>Educational level:</b> II.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |                                         |
| <b>Prerequisites:</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |                                         |
| <b>Course requirements:</b><br>Assessment: evaluation<br>Preliminary assessment: Continuous assessment projects<br>Final assessment: assessment examination 60% (A 90%; B 80%; C 70%; D 60%; E 50%)<br>Scale of assessment (preliminary/final): 40/60                                                                                                                                                                                                                                                                                                                                                         |                                         |
| <b>Learning outcomes:</b><br>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.                                                                                                                                                                                                                                                                                                                                                      |                                         |
| <b>Class syllabus:</b><br>Features (low and medium, global, local), extraction.<br>A selection from the database DB.<br>Detection, face tracking.<br>Color gamut mapping.<br>HDR.<br>Eye movement tracking.<br>Significant areas in the image.<br>Image quality.                                                                                                                                                                                                                                                                                                                                              |                                         |
| <b>Recommended literature:</b><br>Feature extraction : Foundations and applications / Isabelle Guyon ... [et al.] (eds.). Berlin : Springer, 2006<br>Algorithms for image processing and computer vision / J. R. Parker. New York : Wiley, 1997<br>Shape classification and analysis : Theory and practice / Luciano da Fontoura Costa, Roberto Marcondes Cesar, Jr.. Boca Raton, Fla. : CRC Press, 2009<br>Elena Šikudová, Zuzana Černeková, Vanda Benešová, Zuzana Haladová, Júlia Kučerová:<br>Počítačové videnie. Detekcia a rozpoznávanie objektov, vydavateľstvo Wikina, Praha, ISBN: 978-80-87925-06-5 |                                         |
| <b>Languages necessary to complete the course:</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                                         |

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|--------------------------------------------------------------------------------|-------|-------|-------|-------|-------|
| Slovak and English                                                             |       |       |       |       |       |
| <b>Notes:</b>                                                                  |       |       |       |       |       |
| <b>Past grade distribution</b>                                                 |       |       |       |       |       |
| Total number of evaluated students: 46                                         |       |       |       |       |       |
| A                                                                              | B     | C     | D     | E     | FX    |
| 13,04                                                                          | 10,87 | 23,91 | 23,91 | 10,87 | 17,39 |
| <b>Lecturers:</b> Mgr. Ľudovít Balko, PhD., RNDr. Zuzana Berger Haladová, PhD. |       |       |       |       |       |
| <b>Last change:</b> 14.01.2016                                                 |       |       |       |       |       |
| <b>Approved by:</b> prof. RNDr. Július Korbaš, CSc.                            |       |       |       |       |       |

## COURSE DESCRIPTION

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| <b>University:</b> Comenius University in Bratislava                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                                          |
| <b>Faculty:</b> Faculty of Mathematics, Physics and Informatics                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |                                          |
| <b>Course ID:</b><br>FMFI.KAGDM+KAI/2-MPG-167/15                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | <b>Course title:</b><br>Data Compression |
| <b>Educational activities:</b><br><b>Type of activities:</b> lecture<br><b>Number of hours:</b><br><b>per week:</b> 2 <b>per level/semester:</b> 28<br><b>Form of the course:</b> on-site learning                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |                                          |
| <b>Number of credits:</b> 3                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                                          |
| <b>Recommended semester:</b> 2.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |                                          |
| <b>Educational level:</b> II.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                                          |
| <b>Prerequisites:</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |                                          |
| <b>Antirequisites:</b> FMFI.KAI/2-AIN-126/00                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                                          |
| <b>Course requirements:</b><br>Scale of assessment (preliminary/final): 100/0                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                                          |
| <b>Learning outcomes:</b><br>The students will master the fundamentals of the data compression for static and dynamic images.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                                          |
| <b>Class syllabus:</b><br>Lossless coding: the Huffman coding, the Huffman shift coding, the Ziv – Lempel – Welch coding, Run – length encoding, bit plane coding (PDQ, DDC).<br>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. |                                          |
| <b>Recommended literature:</b><br>Vybrané metódy kompresie dát : Kódovanie obrazov / Jaroslav Polec, Tatiana Karlubíková, Miloš Oravec a kol.. Bratislava : Fakulta matematiky, fyziky a informatiky UK, 2000<br>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                                                                                                                                                                                                                                                                                                                                                                                      |                                          |
| <b>Languages necessary to complete the course:</b><br>Slovak and English                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |                                          |
| <b>Notes:</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                                          |

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|-----------------------------------------------------|-----|-----|-----|-----|-----|
| <b>Past grade distribution</b>                      |     |     |     |     |     |
| Total number of evaluated students: 0               |     |     |     |     |     |
| A                                                   | B   | C   | D   | E   | FX  |
| 0,0                                                 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 |
| <b>Lecturers:</b> prof. Ing. Jaroslav Polec, CSc.   |     |     |     |     |     |
| <b>Last change:</b> 03.09.2015                      |     |     |     |     |     |
| <b>Approved by:</b> prof. RNDr. Július Korbaš, CSc. |     |     |     |     |     |

## COURSE DESCRIPTION

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| <b>University:</b> Comenius University in Bratislava                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |                                               |
| <b>Faculty:</b> Faculty of Mathematics, Physics and Informatics                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |                                               |
| <b>Course ID:</b><br>FMFI.KAGDM/2-<br>MPG-108/15                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | <b>Course title:</b><br>Differential Geometry |
| <b>Educational activities:</b><br><b>Type of activities:</b> lecture<br><b>Number of hours:</b><br><b>per week:</b> 3 <b>per level/semester:</b> 42<br><b>Form of the course:</b> on-site learning                                                                                                                                                                                                                                                                                                                                                                                                                                  |                                               |
| <b>Number of credits:</b> 5                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |                                               |
| <b>Recommended semester:</b> 1.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |                                               |
| <b>Educational level:</b> II.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |                                               |
| <b>Prerequisites:</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                                               |
| <b>Course requirements:</b><br>Preliminary assessment: continuous evaluation, tests<br>Final assessment: Final assessment examination 80% (A 90%; B 80%; C 70%; D 60%; E 50%)<br>Scale of assessment (preliminary/final): 20/80                                                                                                                                                                                                                                                                                                                                                                                                     |                                               |
| <b>Learning outcomes:</b><br>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.                                                                                                                                                                                                                                                                                                                                                          |                                               |
| <b>Class syllabus:</b><br>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).<br>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. |                                               |
| <b>Recommended literature:</b><br>Analytická a diferenciální geometrie / Bruno Budinský. Praha : Státní nakladatelství technické literatury, 1983<br>Lectures on classical differential geometry / Dirk J. Struik. Cambridge : Addison-Wesley Press, 1950<br>Electronic texts by the teacher, published on the WWW page of the subject.                                                                                                                                                                                                                                                                                             |                                               |
| <b>Languages necessary to complete the course:</b><br>Slovak and English                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                                               |
| <b>Notes:</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |                                               |

|                                                     |       |       |      |       |      |
|-----------------------------------------------------|-------|-------|------|-------|------|
| <b>Past grade distribution</b>                      |       |       |      |       |      |
| Total number of evaluated students: 172             |       |       |      |       |      |
| A                                                   | B     | C     | D    | E     | FX   |
| 37,21                                               | 20,93 | 18,02 | 9,88 | 11,63 | 2,33 |
| <b>Lecturers:</b> doc. RNDr. Miloš Božek, CSc.      |       |       |      |       |      |
| <b>Last change:</b> 03.09.2015                      |       |       |      |       |      |
| <b>Approved by:</b> prof. RNDr. Július Korbaš, CSc. |       |       |      |       |      |

## COURSE DESCRIPTION

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|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|---------------------------------------------------------------|------|-------|-----|
| <b>University:</b> Comenius University in Bratislava                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |     |                                                               |      |       |     |
| <b>Faculty:</b> Faculty of Mathematics, Physics and Informatics                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |     |                                                               |      |       |     |
| <b>Course ID:</b><br>FMFI.KAGDM/2-MPG-245/00                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |     | <b>Course title:</b><br>Digital and Computational Photography |      |       |     |
| <b>Educational activities:</b><br><b>Type of activities:</b> lecture<br><b>Number of hours:</b><br><b>per week:</b> 2 <b>per level/semester:</b> 28<br><b>Form of the course:</b> on-site learning                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |     |                                                               |      |       |     |
| <b>Number of credits:</b> 3                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |     |                                                               |      |       |     |
| <b>Recommended semester:</b> 3.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |     |                                                               |      |       |     |
| <b>Educational level:</b> II.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |     |                                                               |      |       |     |
| <b>Prerequisites:</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |     |                                                               |      |       |     |
| <b>Course requirements:</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |     |                                                               |      |       |     |
| <b>Learning outcomes:</b><br>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.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |     |                                                               |      |       |     |
| <b>Class syllabus:</b><br>: 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. |     |                                                               |      |       |     |
| <b>Recommended literature:</b><br>Fundamentals of interactive computer graphics / James D. Foley, Andries van Dam. Reading : Addison-Wesley, 1983<br>Spatial Augmented Reality - Merging Real and Virtual Worlds / Bimber O., Raskar R. , A K Peters, 2005, PDF online na predmetovej stránke.<br>Electronic texts by the teacher, published on the WWW page of the subject.                                                                                                                                                                                                                                                                                                                                                                                                   |     |                                                               |      |       |     |
| <b>Languages necessary to complete the course:</b><br>Slovak and English                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |     |                                                               |      |       |     |
| <b>Notes:</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |     |                                                               |      |       |     |
| <b>Past grade distribution</b><br>Total number of evaluated students: 51                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |     |                                                               |      |       |     |
| A                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | B   | C                                                             | D    | E     | FX  |
| 68,63                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | 9,8 | 5,88                                                          | 3,92 | 11,76 | 0,0 |

|                                                                          |
|--------------------------------------------------------------------------|
| <b>Lecturers:</b> prof. Ing. Jaroslav Polec, CSc., Mgr. Tomáš Kovačovský |
| <b>Last change:</b> 02.09.2015                                           |
| <b>Approved by:</b> prof. RNDr. Július Korbaš, CSc.                      |

## COURSE DESCRIPTION

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|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------|--------------------------------------------|------|-------|-------|
| <b>University:</b> Comenius University in Bratislava                                                                                                                                                                                                                                 |       |                                            |      |       |       |
| <b>Faculty:</b> Faculty of Mathematics, Physics and Informatics                                                                                                                                                                                                                      |       |                                            |      |       |       |
| <b>Course ID:</b><br>FMFI.KAGDM/2-MPG-910/00                                                                                                                                                                                                                                         |       | <b>Course title:</b><br>Diploma Thesis (1) |      |       |       |
| <b>Educational activities:</b><br><b>Type of activities:</b> independent work<br><b>Number of hours:</b><br><b>per week: 6 per level/semester: 84</b><br><b>Form of the course:</b> on-site learning                                                                                 |       |                                            |      |       |       |
| <b>Number of credits:</b> 6                                                                                                                                                                                                                                                          |       |                                            |      |       |       |
| <b>Recommended semester:</b> 3.                                                                                                                                                                                                                                                      |       |                                            |      |       |       |
| <b>Educational level:</b> II.                                                                                                                                                                                                                                                        |       |                                            |      |       |       |
| <b>Prerequisites:</b>                                                                                                                                                                                                                                                                |       |                                            |      |       |       |
| <b>Course requirements:</b>                                                                                                                                                                                                                                                          |       |                                            |      |       |       |
| <b>Learning outcomes:</b>                                                                                                                                                                                                                                                            |       |                                            |      |       |       |
| <b>Class syllabus:</b><br>Problem specification and its analysis.<br>Overview of the given area.<br>Methodics of problem solving.<br>Project decision.<br>Plan of the work and its checking.<br>Software realization.<br>Numerical experiments.<br>Structure of diploma thesis text. |       |                                            |      |       |       |
| <b>Recommended literature:</b><br>According to specifications of diploma thesis tutor.                                                                                                                                                                                               |       |                                            |      |       |       |
| <b>Languages necessary to complete the course:</b><br>Slovak and English                                                                                                                                                                                                             |       |                                            |      |       |       |
| <b>Notes:</b>                                                                                                                                                                                                                                                                        |       |                                            |      |       |       |
| <b>Past grade distribution</b><br>Total number of evaluated students: 127                                                                                                                                                                                                            |       |                                            |      |       |       |
| A                                                                                                                                                                                                                                                                                    | B     | C                                          | D    | E     | FX    |
| 42,52                                                                                                                                                                                                                                                                                | 13,39 | 15,75                                      | 7,09 | 10,24 | 11,02 |
| <b>Lecturers:</b> prof. RNDr. Július Korbaš, CSc.                                                                                                                                                                                                                                    |       |                                            |      |       |       |
| <b>Last change:</b> 02.09.2015                                                                                                                                                                                                                                                       |       |                                            |      |       |       |
| <b>Approved by:</b> prof. RNDr. Július Korbaš, CSc.                                                                                                                                                                                                                                  |       |                                            |      |       |       |

## COURSE DESCRIPTION

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|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------|--------------------------------------------|-----|-------|-----|
| <b>University:</b> Comenius University in Bratislava                                                                                                                                                          |      |                                            |     |       |     |
| <b>Faculty:</b> Faculty of Mathematics, Physics and Informatics                                                                                                                                               |      |                                            |     |       |     |
| <b>Course ID:</b><br>FMFI.KAGDM/2-MPG-911/00                                                                                                                                                                  |      | <b>Course title:</b><br>Diploma Thesis (2) |     |       |     |
| <b>Educational activities:</b><br><b>Type of activities:</b> independent work<br><b>Number of hours:</b><br><b>per week:</b> 10 <b>per level/semester:</b> 140<br><b>Form of the course:</b> on-site learning |      |                                            |     |       |     |
| <b>Number of credits:</b> 10                                                                                                                                                                                  |      |                                            |     |       |     |
| <b>Recommended semester:</b> 4.                                                                                                                                                                               |      |                                            |     |       |     |
| <b>Educational level:</b> II.                                                                                                                                                                                 |      |                                            |     |       |     |
| <b>Prerequisites:</b>                                                                                                                                                                                         |      |                                            |     |       |     |
| <b>Course requirements:</b>                                                                                                                                                                                   |      |                                            |     |       |     |
| <b>Learning outcomes:</b>                                                                                                                                                                                     |      |                                            |     |       |     |
| <b>Class syllabus:</b><br>Diploma thesis text writing.                                                                                                                                                        |      |                                            |     |       |     |
| <b>Recommended literature:</b><br>According to specifications of diploma thesis tutor.                                                                                                                        |      |                                            |     |       |     |
| <b>Languages necessary to complete the course:</b><br>Slovak and English                                                                                                                                      |      |                                            |     |       |     |
| <b>Notes:</b>                                                                                                                                                                                                 |      |                                            |     |       |     |
| <b>Past grade distribution</b><br>Total number of evaluated students: 111                                                                                                                                     |      |                                            |     |       |     |
| A                                                                                                                                                                                                             | B    | C                                          | D   | E     | FX  |
| 61,26                                                                                                                                                                                                         | 8,11 | 12,61                                      | 4,5 | 10,81 | 2,7 |
| <b>Lecturers:</b> prof. RNDr. Július Korbaš, CSc.                                                                                                                                                             |      |                                            |     |       |     |
| <b>Last change:</b> 02.09.2015                                                                                                                                                                                |      |                                            |     |       |     |
| <b>Approved by:</b> prof. RNDr. Július Korbaš, CSc.                                                                                                                                                           |      |                                            |     |       |     |

## STATE EXAM DESCRIPTION

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|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------|
| <b>University:</b> Comenius University in Bratislava                                                                                                                                                                                                                              |                                                |
| <b>Faculty:</b> Faculty of Mathematics, Physics and Informatics                                                                                                                                                                                                                   |                                                |
| <b>Course ID:</b><br>FMFI.KAGDM/2-MPG-991/15                                                                                                                                                                                                                                      | <b>Course title:</b><br>Diploma Thesis Defense |
| <b>Number of credits:</b> 4                                                                                                                                                                                                                                                       |                                                |
| <b>Educational level:</b> II.                                                                                                                                                                                                                                                     |                                                |
| <b>Course requirements:</b><br>Assessment: State Examination - Thesis Defence<br>Preliminary assessment: 0%<br>Final assessment: 100%<br>Scale of assessment (preliminary/final): 100/0                                                                                           |                                                |
| <b>Learning outcomes:</b><br>The students write, submit and defend their diploma theses, and thus gain several competences specified in the graduate's characteristic in this study programme.                                                                                    |                                                |
| <b>Class syllabus:</b><br>Individual work by the student, under the guidance of the diploma thesis supervisor. Writing and submitting a diploma thesis. Defense of the diploma thesis.                                                                                            |                                                |
| <b>State exam syllabus:</b>                                                                                                                                                                                                                                                       |                                                |
| <b>Recommended literature:</b><br>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 |                                                |
| <b>Languages necessary to complete the course:</b><br>Slovak and English                                                                                                                                                                                                          |                                                |
| <b>Last change:</b> 03.09.2015                                                                                                                                                                                                                                                    |                                                |
| <b>Approved by:</b> prof. RNDr. Július Korbaš, CSc.                                                                                                                                                                                                                               |                                                |

## COURSE DESCRIPTION

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| <b>University:</b> Comenius University in Bratislava                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                                                    |
| <b>Faculty:</b> Faculty of Mathematics, Physics and Informatics                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |                                                    |
| <b>Course ID:</b><br>FMFL.KAGDM/2-MPG-920/00                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | <b>Course title:</b><br>Diploma Thesis Seminar (1) |
| <b>Educational activities:</b><br><b>Type of activities:</b> seminar<br><b>Number of hours:</b><br><b>per week:</b> 2 <b>per level/semester:</b> 28<br><b>Form of the course:</b> on-site learning                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                                                    |
| <b>Number of credits:</b> 2                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                                                    |
| <b>Recommended semester:</b> 2.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |                                                    |
| <b>Educational level:</b> II.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |                                                    |
| <b>Prerequisites:</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                                                    |
| <b>Course requirements:</b><br>Assessment: evaluation<br>Preliminary assessment: 100% Continuous assessment, oral and WWW presentations<br>Final assessment: 0% Final evaluation exam<br>A 90%, B 80%, C 70%, D 60%, E 50%<br>Scale of assessment (preliminary/final): 100/0                                                                                                                                                                                                                                                                                                                                                                                                                   |                                                    |
| <b>Learning outcomes:</b><br>Obtain and train professional skills and experience for individual and cooperative research work for medium size projects.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                                                    |
| <b>Class syllabus:</b><br>An overview on technology of scientific methodology and research work on medium size projects.<br>Scientific writing. Requirements and conventions.<br>Student presentations of their diploma projects and work in progress.                                                                                                                                                                                                                                                                                                                                                                                                                                         |                                                    |
| <b>Recommended literature:</b><br>According to requirements of thesis advisor.<br>Fundamentals of interactive computer graphics / James D. Foley, Andries van Dam. Reading : Addison-Wesley, 1983<br>Curves and Surfaces for computer-Aided geometric design : A practical Guide / Gerald E. Farin. San Diego : Academic Press, 1997<br>Počítačová grafika a spracovanie obrazu / Eugen Ružický, Andrej Ferko. Bratislava : Sapientia, 1995<br>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 |                                                    |
| <b>Languages necessary to complete the course:</b><br>Slovak and English                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |                                                    |
| <b>Notes:</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |                                                    |

|                                                     |      |      |     |       |      |
|-----------------------------------------------------|------|------|-----|-------|------|
| <b>Past grade distribution</b>                      |      |      |     |       |      |
| Total number of evaluated students: 137             |      |      |     |       |      |
| A                                                   | B    | C    | D   | E     | FX   |
| 75,18                                               | 0,73 | 8,03 | 0,0 | 13,87 | 2,19 |
| <b>Lecturers:</b> doc. RNDr. Andrej Ferko, PhD.     |      |      |     |       |      |
| <b>Last change:</b> 03.09.2015                      |      |      |     |       |      |
| <b>Approved by:</b> prof. RNDr. Július Korbaš, CSc. |      |      |     |       |      |

## COURSE DESCRIPTION

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| <b>University:</b> Comenius University in Bratislava                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |                                                    |
| <b>Faculty:</b> Faculty of Mathematics, Physics and Informatics                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                                                    |
| <b>Course ID:</b><br>FMFI.KAGDM/2-MPG-921/00                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | <b>Course title:</b><br>Diploma Thesis Seminar (2) |
| <b>Educational activities:</b><br><b>Type of activities:</b> seminar<br><b>Number of hours:</b><br><b>per week: 2 per level/semester: 28</b><br><b>Form of the course:</b> on-site learning                                                                                                                                                                                                                                                                                                                                                                                                |                                                    |
| <b>Number of credits:</b> 2                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |                                                    |
| <b>Recommended semester:</b> 3.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                                                    |
| <b>Educational level:</b> II.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |                                                    |
| <b>Prerequisites:</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |                                                    |
| <b>Course requirements:</b><br>Assessment: evaluation<br>Preliminary assessment: 100% Continuous assessment, oral and WWW presentations<br>Final assessment: 0% Final evaluation exam<br>A 90%, B 80%, C 70%, D 60%, E 50%<br>Scale of assessment (preliminary/final): 100/0                                                                                                                                                                                                                                                                                                               |                                                    |
| <b>Learning outcomes:</b><br>Obtain and train professional skills and experience for individual and cooperative research work for large size projects.                                                                                                                                                                                                                                                                                                                                                                                                                                     |                                                    |
| <b>Class syllabus:</b><br>Student presentations of their diploma projects and work in progress.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                                                    |
| <b>Recommended literature:</b><br>According to requirements of thesis advisor.<br>According to requirements of thesis advisors.<br>Zložitost' geometrických algoritmov / Pavel Chalmovianský, Andrej Ferko, Roman Galbavý.<br>Bratislava : Univerzita Komenského, 2001<br>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<br>Master's thesis relevant selection of recent research papers. |                                                    |
| <b>Languages necessary to complete the course:</b><br>Slovak and English                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |                                                    |
| <b>Notes:</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |                                                    |

|                                                     |      |       |     |      |       |
|-----------------------------------------------------|------|-------|-----|------|-------|
| <b>Past grade distribution</b>                      |      |       |     |      |       |
| Total number of evaluated students: 133             |      |       |     |      |       |
| A                                                   | B    | C     | D   | E    | FX    |
| 67,67                                               | 3,76 | 15,04 | 0,0 | 2,26 | 11,28 |
| <b>Lecturers:</b> doc. RNDr. Andrej Ferko, PhD.     |      |       |     |      |       |
| <b>Last change:</b> 03.09.2015                      |      |       |     |      |       |
| <b>Approved by:</b> prof. RNDr. Július Korbaš, CSc. |      |       |     |      |       |

## COURSE DESCRIPTION

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|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------|---------------------------------------------------------|------|------|------|
| <b>University:</b> Comenius University in Bratislava                                                                                                                                                                                                                                                  |       |                                                         |      |      |      |
| <b>Faculty:</b> Faculty of Mathematics, Physics and Informatics                                                                                                                                                                                                                                       |       |                                                         |      |      |      |
| <b>Course ID:</b><br>FMFI.KJP/1-MXX-233/13                                                                                                                                                                                                                                                            |       | <b>Course title:</b><br>English Conversation Course (1) |      |      |      |
| <b>Educational activities:</b><br><b>Type of activities:</b> practicals<br><b>Number of hours:</b><br><b>per week:</b> 2 <b>per level/semester:</b> 28<br><b>Form of the course:</b> on-site learning                                                                                                 |       |                                                         |      |      |      |
| <b>Number of credits:</b> 2                                                                                                                                                                                                                                                                           |       |                                                         |      |      |      |
| <b>Recommended semester:</b> 1., 3.                                                                                                                                                                                                                                                                   |       |                                                         |      |      |      |
| <b>Educational level:</b> I., II.                                                                                                                                                                                                                                                                     |       |                                                         |      |      |      |
| <b>Prerequisites:</b>                                                                                                                                                                                                                                                                                 |       |                                                         |      |      |      |
| <b>Course requirements:</b><br>Scale of assessment (preliminary/final): 100/0                                                                                                                                                                                                                         |       |                                                         |      |      |      |
| <b>Learning outcomes:</b>                                                                                                                                                                                                                                                                             |       |                                                         |      |      |      |
| <b>Class syllabus:</b><br>The content of the course is general English.<br>The language level is B2/C1 (Upper-Intermediate/Lower Advanced).                                                                                                                                                           |       |                                                         |      |      |      |
| <b>Recommended literature:</b><br>Selection of materials from Inside Out Upper-Intermediate, Cutting Edge Upper-Intermediate, New English File Upper-Intermediate, British and American newspapers and journals<br>Recordings: authentic and semi-authentic (source: BBC, CNN, coursebook recordings) |       |                                                         |      |      |      |
| <b>Languages necessary to complete the course:</b>                                                                                                                                                                                                                                                    |       |                                                         |      |      |      |
| <b>Notes:</b>                                                                                                                                                                                                                                                                                         |       |                                                         |      |      |      |
| <b>Past grade distribution</b><br>Total number of evaluated students: 135                                                                                                                                                                                                                             |       |                                                         |      |      |      |
| A                                                                                                                                                                                                                                                                                                     | B     | C                                                       | D    | E    | FX   |
| 58,52                                                                                                                                                                                                                                                                                                 | 18,52 | 9,63                                                    | 2,22 | 1,48 | 9,63 |
| <b>Lecturers:</b> PhDr. Elena Klátiková                                                                                                                                                                                                                                                               |       |                                                         |      |      |      |
| <b>Last change:</b> 02.06.2015                                                                                                                                                                                                                                                                        |       |                                                         |      |      |      |
| <b>Approved by:</b> prof. RNDr. Július Korbaš, CSc.                                                                                                                                                                                                                                                   |       |                                                         |      |      |      |

## COURSE DESCRIPTION

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| <b>University:</b> Comenius University in Bratislava                                                                                                                                                                                                                                                  |       |                                                         |     |     |      |
| <b>Faculty:</b> Faculty of Mathematics, Physics and Informatics                                                                                                                                                                                                                                       |       |                                                         |     |     |      |
| <b>Course ID:</b><br>FMFI.KJP/1-MXX-234/13                                                                                                                                                                                                                                                            |       | <b>Course title:</b><br>English Conversation Course (2) |     |     |      |
| <b>Educational activities:</b><br><b>Type of activities:</b> practicals<br><b>Number of hours:</b><br><b>per week:</b> 2 <b>per level/semester:</b> 28<br><b>Form of the course:</b> on-site learning                                                                                                 |       |                                                         |     |     |      |
| <b>Number of credits:</b> 2                                                                                                                                                                                                                                                                           |       |                                                         |     |     |      |
| <b>Recommended semester:</b> 2., 4.                                                                                                                                                                                                                                                                   |       |                                                         |     |     |      |
| <b>Educational level:</b> I., II.                                                                                                                                                                                                                                                                     |       |                                                         |     |     |      |
| <b>Prerequisites:</b>                                                                                                                                                                                                                                                                                 |       |                                                         |     |     |      |
| <b>Course requirements:</b><br>Scale of assessment (preliminary/final): 100/0                                                                                                                                                                                                                         |       |                                                         |     |     |      |
| <b>Learning outcomes:</b>                                                                                                                                                                                                                                                                             |       |                                                         |     |     |      |
| <b>Class syllabus:</b><br>The course is a follow-up to the Conversation Course in English (1). The content of the course is general English.<br>The language level is B2/C1 (Upper-Intermediate/Lower Advanced).                                                                                      |       |                                                         |     |     |      |
| <b>Recommended literature:</b><br>Selection of materials from Inside Out Upper-Intermediate, Cutting Edge Upper-Intermediate, New English File Upper-Intermediate, British and American newspapers and journals<br>Recordings: authentic and semi-authentic (source: BBC, CNN, coursebook recordings) |       |                                                         |     |     |      |
| <b>Languages necessary to complete the course:</b>                                                                                                                                                                                                                                                    |       |                                                         |     |     |      |
| <b>Notes:</b>                                                                                                                                                                                                                                                                                         |       |                                                         |     |     |      |
| <b>Past grade distribution</b><br>Total number of evaluated students: 62                                                                                                                                                                                                                              |       |                                                         |     |     |      |
| A                                                                                                                                                                                                                                                                                                     | B     | C                                                       | D   | E   | FX   |
| 67,74                                                                                                                                                                                                                                                                                                 | 19,35 | 4,84                                                    | 0,0 | 0,0 | 8,06 |
| <b>Lecturers:</b> PhDr. Elena Klátiková                                                                                                                                                                                                                                                               |       |                                                         |     |     |      |
| <b>Last change:</b> 02.06.2015                                                                                                                                                                                                                                                                        |       |                                                         |     |     |      |
| <b>Approved by:</b> prof. RNDr. Július Korbaš, CSc.                                                                                                                                                                                                                                                   |       |                                                         |     |     |      |

## COURSE DESCRIPTION

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| <b>University:</b> Comenius University in Bratislava                                                                                                                                                                                                                                                                                                      |       |                                           |       |       |     |
| <b>Faculty:</b> Faculty of Mathematics, Physics and Informatics                                                                                                                                                                                                                                                                                           |       |                                           |       |       |     |
| <b>Course ID:</b><br>FMFI.KAI/2-MPG-149/00                                                                                                                                                                                                                                                                                                                |       | <b>Course title:</b><br>Fractal Modelling |       |       |     |
| <b>Educational activities:</b><br><b>Type of activities:</b> lecture<br><b>Number of hours:</b><br><b>per week:</b> 2 <b>per level/semester:</b> 28<br><b>Form of the course:</b> on-site learning                                                                                                                                                        |       |                                           |       |       |     |
| <b>Number of credits:</b> 3                                                                                                                                                                                                                                                                                                                               |       |                                           |       |       |     |
| <b>Recommended semester:</b> 2.                                                                                                                                                                                                                                                                                                                           |       |                                           |       |       |     |
| <b>Educational level:</b> II.                                                                                                                                                                                                                                                                                                                             |       |                                           |       |       |     |
| <b>Prerequisites:</b>                                                                                                                                                                                                                                                                                                                                     |       |                                           |       |       |     |
| <b>Course requirements:</b><br>Assessment: evaluation<br>Preliminary assessment: 100% Continuous assessment, tests<br>Final assessment: 0% Final assessment exam<br>A 90%, B 80%, C 70%, D 60%, E 50%                                                                                                                                                     |       |                                           |       |       |     |
| <b>Learning outcomes:</b><br>Overview of fractal geometry and its applications in computer graphics.                                                                                                                                                                                                                                                      |       |                                           |       |       |     |
| <b>Class syllabus:</b><br>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).                                        |       |                                           |       |       |     |
| <b>Recommended literature:</b><br>Peitgen, H.-O., Saupe D.: The Science of Fractal Images, Springer Verlag<br>Benoit B. Mandelbrot: The Fractal Geometry of Nature, W. H. Freeman<br>Fractals everywhere / Michael F. Barnsley. San Francisco : Morgan Kaufmann, 1993<br>Digital study materials by the lecturer, published online at the class web page. |       |                                           |       |       |     |
| <b>Languages necessary to complete the course:</b><br>Slovak and English                                                                                                                                                                                                                                                                                  |       |                                           |       |       |     |
| <b>Notes:</b>                                                                                                                                                                                                                                                                                                                                             |       |                                           |       |       |     |
| <b>Past grade distribution</b><br>Total number of evaluated students: 90                                                                                                                                                                                                                                                                                  |       |                                           |       |       |     |
| A                                                                                                                                                                                                                                                                                                                                                         | B     | C                                         | D     | E     | FX  |
| 33,33                                                                                                                                                                                                                                                                                                                                                     | 15,56 | 13,33                                     | 13,33 | 24,44 | 0,0 |
| <b>Lecturers:</b> doc. RNDr. Andrej Ferko, PhD.                                                                                                                                                                                                                                                                                                           |       |                                           |       |       |     |
| <b>Last change:</b> 03.09.2015                                                                                                                                                                                                                                                                                                                            |       |                                           |       |       |     |
| <b>Approved by:</b> prof. RNDr. Július Korbaš, CSc.                                                                                                                                                                                                                                                                                                       |       |                                           |       |       |     |

## COURSE DESCRIPTION

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| <b>University:</b> Comenius University in Bratislava                                                                                                                                                                                                                  |       |                                             |       |      |      |
| <b>Faculty:</b> Faculty of Mathematics, Physics and Informatics                                                                                                                                                                                                       |       |                                             |       |      |      |
| <b>Course ID:</b><br>FMFL.KJP/1-MXX-141/00                                                                                                                                                                                                                            |       | <b>Course title:</b><br>French Language (1) |       |      |      |
| <b>Educational activities:</b><br><b>Type of activities:</b> practicals<br><b>Number of hours:</b><br><b>per week:</b> 2 <b>per level/semester:</b> 28<br><b>Form of the course:</b> on-site learning                                                                 |       |                                             |       |      |      |
| <b>Number of credits:</b> 2                                                                                                                                                                                                                                           |       |                                             |       |      |      |
| <b>Recommended semester:</b> 1.                                                                                                                                                                                                                                       |       |                                             |       |      |      |
| <b>Educational level:</b> I., II.                                                                                                                                                                                                                                     |       |                                             |       |      |      |
| <b>Prerequisites:</b>                                                                                                                                                                                                                                                 |       |                                             |       |      |      |
| <b>Course requirements:</b>                                                                                                                                                                                                                                           |       |                                             |       |      |      |
| <b>Learning outcomes:</b>                                                                                                                                                                                                                                             |       |                                             |       |      |      |
| <b>Class syllabus:</b><br>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. |       |                                             |       |      |      |
| <b>Recommended literature:</b><br>Pravda, Pravdová: Učebnica francúzštiny pre samoukov a kurzy, SPN Bratislava 1999, ISBN 80-08-00431-2                                                                                                                               |       |                                             |       |      |      |
| <b>Languages necessary to complete the course:</b>                                                                                                                                                                                                                    |       |                                             |       |      |      |
| <b>Notes:</b>                                                                                                                                                                                                                                                         |       |                                             |       |      |      |
| <b>Past grade distribution</b><br>Total number of evaluated students: 374                                                                                                                                                                                             |       |                                             |       |      |      |
| A                                                                                                                                                                                                                                                                     | B     | C                                           | D     | E    | FX   |
| 39,84                                                                                                                                                                                                                                                                 | 22,19 | 21,66                                       | 10,16 | 2,14 | 4,01 |
| <b>Lecturers:</b> Mgr. Pavel Vilášek, Mgr. Ľubomíra Kožehubová                                                                                                                                                                                                        |       |                                             |       |      |      |
| <b>Last change:</b> 02.06.2015                                                                                                                                                                                                                                        |       |                                             |       |      |      |
| <b>Approved by:</b> prof. RNDr. Július Korbaš, CSc.                                                                                                                                                                                                                   |       |                                             |       |      |      |

## COURSE DESCRIPTION

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| <b>University:</b> Comenius University in Bratislava                                                                                                                                                                                                                                                                |       |                                             |       |      |      |
| <b>Faculty:</b> Faculty of Mathematics, Physics and Informatics                                                                                                                                                                                                                                                     |       |                                             |       |      |      |
| <b>Course ID:</b><br>FMFI.KJP/1-MXX-142/00                                                                                                                                                                                                                                                                          |       | <b>Course title:</b><br>French Language (2) |       |      |      |
| <b>Educational activities:</b><br><b>Type of activities:</b> practicals<br><b>Number of hours:</b><br><b>per week:</b> 2 <b>per level/semester:</b> 28<br><b>Form of the course:</b> on-site learning                                                                                                               |       |                                             |       |      |      |
| <b>Number of credits:</b> 2                                                                                                                                                                                                                                                                                         |       |                                             |       |      |      |
| <b>Recommended semester:</b> 2.                                                                                                                                                                                                                                                                                     |       |                                             |       |      |      |
| <b>Educational level:</b> I., II.                                                                                                                                                                                                                                                                                   |       |                                             |       |      |      |
| <b>Prerequisites:</b>                                                                                                                                                                                                                                                                                               |       |                                             |       |      |      |
| <b>Course requirements:</b>                                                                                                                                                                                                                                                                                         |       |                                             |       |      |      |
| <b>Learning outcomes:</b>                                                                                                                                                                                                                                                                                           |       |                                             |       |      |      |
| <b>Class syllabus:</b><br>The subject continues the program of French language (1) and provides courses of essential and intermediate French language.                                                                                                                                                              |       |                                             |       |      |      |
| <b>Recommended literature:</b><br>Pravda, Pravdová: Učebnica francúzštiny pre samoukov a kurzy, SPN Bratislava 1999, ISBN 80-08-00431-2<br>Blažena Srncová: Učebnica francúzštiny pre študentov Matematicko-fyzikálnej fakulty , UK 1983<br>Kolektív Lingea, s.r.o.: Slovensko-francúzsky hovorník, Bratislava 2008 |       |                                             |       |      |      |
| <b>Languages necessary to complete the course:</b>                                                                                                                                                                                                                                                                  |       |                                             |       |      |      |
| <b>Notes:</b>                                                                                                                                                                                                                                                                                                       |       |                                             |       |      |      |
| <b>Past grade distribution</b><br>Total number of evaluated students: 237                                                                                                                                                                                                                                           |       |                                             |       |      |      |
| A                                                                                                                                                                                                                                                                                                                   | B     | C                                           | D     | E    | FX   |
| 34,18                                                                                                                                                                                                                                                                                                               | 27,85 | 21,52                                       | 11,39 | 2,53 | 2,53 |
| <b>Lecturers:</b> Mgr. Pavel Vilášek, Mgr. Ľubomíra Kožehubová                                                                                                                                                                                                                                                      |       |                                             |       |      |      |
| <b>Last change:</b> 02.06.2015                                                                                                                                                                                                                                                                                      |       |                                             |       |      |      |
| <b>Approved by:</b> prof. RNDr. Július Korbaš, CSc.                                                                                                                                                                                                                                                                 |       |                                             |       |      |      |

## COURSE DESCRIPTION

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| <b>University:</b> Comenius University in Bratislava                                                                                                                                                                                                                                                                |       |                                             |      |      |     |
| <b>Faculty:</b> Faculty of Mathematics, Physics and Informatics                                                                                                                                                                                                                                                     |       |                                             |      |      |     |
| <b>Course ID:</b><br>FMFI.KJP/1-MXX-241/00                                                                                                                                                                                                                                                                          |       | <b>Course title:</b><br>French Language (3) |      |      |     |
| <b>Educational activities:</b><br><b>Type of activities:</b> practicals<br><b>Number of hours:</b><br><b>per week:</b> 2 <b>per level/semester:</b> 28<br><b>Form of the course:</b> on-site learning                                                                                                               |       |                                             |      |      |     |
| <b>Number of credits:</b> 2                                                                                                                                                                                                                                                                                         |       |                                             |      |      |     |
| <b>Recommended semester:</b> 3.                                                                                                                                                                                                                                                                                     |       |                                             |      |      |     |
| <b>Educational level:</b> I., II.                                                                                                                                                                                                                                                                                   |       |                                             |      |      |     |
| <b>Prerequisites:</b>                                                                                                                                                                                                                                                                                               |       |                                             |      |      |     |
| <b>Course requirements:</b>                                                                                                                                                                                                                                                                                         |       |                                             |      |      |     |
| <b>Learning outcomes:</b>                                                                                                                                                                                                                                                                                           |       |                                             |      |      |     |
| <b>Class syllabus:</b><br>The subject provides a course of intermediate French language, covering not only general, but also technical language.                                                                                                                                                                    |       |                                             |      |      |     |
| <b>Recommended literature:</b><br>Pravda, Pravdová: Učebnica francúzštiny pre samoukov a kurzy, SPN Bratislava 1999, ISBN 80-08-00431-2<br>Blažena Srncová: Učebnica francúzštiny pre študentov Matematicko-fyzikálnej fakulty , UK 1983<br>Kolektív Lingea, s.r.o.: Slovensko-francúzsky hovorník, Bratislava 2008 |       |                                             |      |      |     |
| <b>Languages necessary to complete the course:</b>                                                                                                                                                                                                                                                                  |       |                                             |      |      |     |
| <b>Notes:</b>                                                                                                                                                                                                                                                                                                       |       |                                             |      |      |     |
| <b>Past grade distribution</b><br>Total number of evaluated students: 93                                                                                                                                                                                                                                            |       |                                             |      |      |     |
| A                                                                                                                                                                                                                                                                                                                   | B     | C                                           | D    | E    | FX  |
| 33,33                                                                                                                                                                                                                                                                                                               | 30,11 | 23,66                                       | 7,53 | 1,08 | 4,3 |
| <b>Lecturers:</b> Mgr. Pavel Vilášek, Mgr. Ľubomíra Kožehubová                                                                                                                                                                                                                                                      |       |                                             |      |      |     |
| <b>Last change:</b> 02.06.2015                                                                                                                                                                                                                                                                                      |       |                                             |      |      |     |
| <b>Approved by:</b> prof. RNDr. Július Korbaš, CSc.                                                                                                                                                                                                                                                                 |       |                                             |      |      |     |

## COURSE DESCRIPTION

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| <b>University:</b> Comenius University in Bratislava                                                                                                                                                                                                                                                                                                                                                       |      |                                             |      |      |      |
| <b>Faculty:</b> Faculty of Mathematics, Physics and Informatics                                                                                                                                                                                                                                                                                                                                            |      |                                             |      |      |      |
| <b>Course ID:</b><br>FMFL.KJP/1-MXX-242/00                                                                                                                                                                                                                                                                                                                                                                 |      | <b>Course title:</b><br>French Language (4) |      |      |      |
| <b>Educational activities:</b><br><b>Type of activities:</b> practicals<br><b>Number of hours:</b><br><b>per week:</b> 2 <b>per level/semester:</b> 28<br><b>Form of the course:</b> on-site learning                                                                                                                                                                                                      |      |                                             |      |      |      |
| <b>Number of credits:</b> 2                                                                                                                                                                                                                                                                                                                                                                                |      |                                             |      |      |      |
| <b>Recommended semester:</b> 4.                                                                                                                                                                                                                                                                                                                                                                            |      |                                             |      |      |      |
| <b>Educational level:</b> I., II.                                                                                                                                                                                                                                                                                                                                                                          |      |                                             |      |      |      |
| <b>Prerequisites:</b>                                                                                                                                                                                                                                                                                                                                                                                      |      |                                             |      |      |      |
| <b>Course requirements:</b>                                                                                                                                                                                                                                                                                                                                                                                |      |                                             |      |      |      |
| <b>Learning outcomes:</b>                                                                                                                                                                                                                                                                                                                                                                                  |      |                                             |      |      |      |
| <b>Class syllabus:</b><br>The subject provides a course of intermediate French covering not only general, but also technical French language.                                                                                                                                                                                                                                                              |      |                                             |      |      |      |
| <b>Recommended literature:</b><br>Pravda, Pravdová: Učebnica francúzštiny pre samoukov a kurzy, SPN Bratislava 1999, ISBN 80-08-00431-2<br>Blažena Srncová: Učebnica francúzštiny pre študentov Matematicko-fyzikálnej fakulty , UK 1983<br>Kolektív Lingea, s.r.o.: Slovensko-francúzsky hovorník, Bratislava 2008<br>Zarha Lahmidi: Sciences-techniques.com, ISBN 209-0331186-0, CLE international, 2005 |      |                                             |      |      |      |
| <b>Languages necessary to complete the course:</b>                                                                                                                                                                                                                                                                                                                                                         |      |                                             |      |      |      |
| <b>Notes:</b>                                                                                                                                                                                                                                                                                                                                                                                              |      |                                             |      |      |      |
| <b>Past grade distribution</b><br>Total number of evaluated students: 63                                                                                                                                                                                                                                                                                                                                   |      |                                             |      |      |      |
| A                                                                                                                                                                                                                                                                                                                                                                                                          | B    | C                                           | D    | E    | FX   |
| 31,75                                                                                                                                                                                                                                                                                                                                                                                                      | 38,1 | 20,63                                       | 3,17 | 1,59 | 4,76 |
| <b>Lecturers:</b> Mgr. Pavel Vilášek, Mgr. Ľubomíra Kožehubová                                                                                                                                                                                                                                                                                                                                             |      |                                             |      |      |      |
| <b>Last change:</b> 02.06.2015                                                                                                                                                                                                                                                                                                                                                                             |      |                                             |      |      |      |
| <b>Approved by:</b> prof. RNDr. Július Korbaš, CSc.                                                                                                                                                                                                                                                                                                                                                        |      |                                             |      |      |      |

## STATE EXAM DESCRIPTION

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| <b>University:</b> Comenius University in Bratislava                                                                                                                                                                                                                                                                                   |                                             |
| <b>Faculty:</b> Faculty of Mathematics, Physics and Informatics                                                                                                                                                                                                                                                                        |                                             |
| <b>Course ID:</b><br>FMFI.KAGDM/2-MPG-953/15                                                                                                                                                                                                                                                                                           | <b>Course title:</b><br>Geometric Modelling |
| <b>Number of credits:</b> 6                                                                                                                                                                                                                                                                                                            |                                             |
| <b>Educational level:</b> II.                                                                                                                                                                                                                                                                                                          |                                             |
| <b>Course requirements:</b><br>Assessment: State Examination<br>Preliminary assessment: 0%<br>Final assessment: 100%<br>A 90%, B 80%, C 70%, D 60%, E 50%<br>Scale of assessment (preliminary/final): 100/0                                                                                                                            |                                             |
| <b>Learning outcomes:</b><br>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.                                                       |                                             |
| <b>Class syllabus:</b><br>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). |                                             |
| <b>State exam syllabus:</b>                                                                                                                                                                                                                                                                                                            |                                             |
| <b>Languages necessary to complete the course:</b><br>Slovak and English                                                                                                                                                                                                                                                               |                                             |
| <b>Last change:</b> 03.09.2015                                                                                                                                                                                                                                                                                                         |                                             |
| <b>Approved by:</b> prof. RNDr. Július Korbaš, CSc.                                                                                                                                                                                                                                                                                    |                                             |

## COURSE DESCRIPTION

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| <b>University:</b> Comenius University in Bratislava                                                                                                                                                                                                 |       |                                             |       |      |      |
| <b>Faculty:</b> Faculty of Mathematics, Physics and Informatics                                                                                                                                                                                      |       |                                             |       |      |      |
| <b>Course ID:</b><br>FMFI.KJP/1-MXX-151/00                                                                                                                                                                                                           |       | <b>Course title:</b><br>German Language (1) |       |      |      |
| <b>Educational activities:</b><br><b>Type of activities:</b> practicals<br><b>Number of hours:</b><br><b>per week:</b> 2 <b>per level/semester:</b> 28<br><b>Form of the course:</b> on-site learning                                                |       |                                             |       |      |      |
| <b>Number of credits:</b> 2                                                                                                                                                                                                                          |       |                                             |       |      |      |
| <b>Recommended semester:</b> 1.                                                                                                                                                                                                                      |       |                                             |       |      |      |
| <b>Educational level:</b> I., II.                                                                                                                                                                                                                    |       |                                             |       |      |      |
| <b>Prerequisites:</b>                                                                                                                                                                                                                                |       |                                             |       |      |      |
| <b>Course requirements:</b>                                                                                                                                                                                                                          |       |                                             |       |      |      |
| <b>Learning outcomes:</b>                                                                                                                                                                                                                            |       |                                             |       |      |      |
| <b>Class syllabus:</b><br>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. |       |                                             |       |      |      |
| <b>Recommended literature:</b><br>Vilášek, P.: Nemčina pre študentov FMFI, Na webovej stránke autora v elektronickej podobe.                                                                                                                         |       |                                             |       |      |      |
| <b>Languages necessary to complete the course:</b>                                                                                                                                                                                                   |       |                                             |       |      |      |
| <b>Notes:</b>                                                                                                                                                                                                                                        |       |                                             |       |      |      |
| <b>Past grade distribution</b><br>Total number of evaluated students: 648                                                                                                                                                                            |       |                                             |       |      |      |
| A                                                                                                                                                                                                                                                    | B     | C                                           | D     | E    | FX   |
| 31,94                                                                                                                                                                                                                                                | 29,17 | 21,3                                        | 10,03 | 2,93 | 4,63 |
| <b>Lecturers:</b> Mgr. Pavel Vilášek, Mgr. Alexandra Maďarová                                                                                                                                                                                        |       |                                             |       |      |      |
| <b>Last change:</b> 02.06.2015                                                                                                                                                                                                                       |       |                                             |       |      |      |
| <b>Approved by:</b> prof. RNDr. Július Korbaš, CSc.                                                                                                                                                                                                  |       |                                             |       |      |      |

## COURSE DESCRIPTION

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|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------|---------------------------------------------|-------|------|------|
| <b>University:</b> Comenius University in Bratislava                                                                                                                                                  |       |                                             |       |      |      |
| <b>Faculty:</b> Faculty of Mathematics, Physics and Informatics                                                                                                                                       |       |                                             |       |      |      |
| <b>Course ID:</b><br>FMFI.KJP/1-MXX-152/00                                                                                                                                                            |       | <b>Course title:</b><br>German Language (2) |       |      |      |
| <b>Educational activities:</b><br><b>Type of activities:</b> practicals<br><b>Number of hours:</b><br><b>per week:</b> 2 <b>per level/semester:</b> 28<br><b>Form of the course:</b> on-site learning |       |                                             |       |      |      |
| <b>Number of credits:</b> 2                                                                                                                                                                           |       |                                             |       |      |      |
| <b>Recommended semester:</b> 2.                                                                                                                                                                       |       |                                             |       |      |      |
| <b>Educational level:</b> I., II.                                                                                                                                                                     |       |                                             |       |      |      |
| <b>Prerequisites:</b>                                                                                                                                                                                 |       |                                             |       |      |      |
| <b>Course requirements:</b>                                                                                                                                                                           |       |                                             |       |      |      |
| <b>Learning outcomes:</b>                                                                                                                                                                             |       |                                             |       |      |      |
| <b>Class syllabus:</b><br>The course continues the program of German language (1). German language is taught at three levels: beginner, intermediate, advanced.                                       |       |                                             |       |      |      |
| <b>Recommended literature:</b><br>Vilášek, P.: Nemčina pre študentov FMFI, Na webovej stránke autora v elektronickej podobe.                                                                          |       |                                             |       |      |      |
| <b>Languages necessary to complete the course:</b>                                                                                                                                                    |       |                                             |       |      |      |
| <b>Notes:</b>                                                                                                                                                                                         |       |                                             |       |      |      |
| <b>Past grade distribution</b><br>Total number of evaluated students: 408                                                                                                                             |       |                                             |       |      |      |
| A                                                                                                                                                                                                     | B     | C                                           | D     | E    | FX   |
| 29,17                                                                                                                                                                                                 | 22,06 | 23,77                                       | 14,95 | 3,68 | 6,37 |
| <b>Lecturers:</b> Mgr. Pavel Vilášek, Mgr. Alexandra Maďarová                                                                                                                                         |       |                                             |       |      |      |
| <b>Last change:</b> 02.06.2015                                                                                                                                                                        |       |                                             |       |      |      |
| <b>Approved by:</b> prof. RNDr. Július Korbaš, CSc.                                                                                                                                                   |       |                                             |       |      |      |

## COURSE DESCRIPTION

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| <b>University:</b> Comenius University in Bratislava                                                                                                                                                                             |       |                                             |      |     |     |
| <b>Faculty:</b> Faculty of Mathematics, Physics and Informatics                                                                                                                                                                  |       |                                             |      |     |     |
| <b>Course ID:</b><br>FMFI.KJP/1-MXX-251/00                                                                                                                                                                                       |       | <b>Course title:</b><br>German Language (3) |      |     |     |
| <b>Educational activities:</b><br><b>Type of activities:</b> practicals<br><b>Number of hours:</b><br><b>per week:</b> 2 <b>per level/semester:</b> 28<br><b>Form of the course:</b> on-site learning                            |       |                                             |      |     |     |
| <b>Number of credits:</b> 2                                                                                                                                                                                                      |       |                                             |      |     |     |
| <b>Recommended semester:</b> 3.                                                                                                                                                                                                  |       |                                             |      |     |     |
| <b>Educational level:</b> I., II.                                                                                                                                                                                                |       |                                             |      |     |     |
| <b>Prerequisites:</b>                                                                                                                                                                                                            |       |                                             |      |     |     |
| <b>Course requirements:</b>                                                                                                                                                                                                      |       |                                             |      |     |     |
| <b>Learning outcomes:</b>                                                                                                                                                                                                        |       |                                             |      |     |     |
| <b>Class syllabus:</b><br>The subject continues the program of German language (2). It provides a course of intermediate and advanced German language.                                                                           |       |                                             |      |     |     |
| <b>Recommended literature:</b><br>Vilášek, P.: Nemčina pre študentov FMFI, Na webovej stránke autora v elektronickej podobe.<br>Aus moderner Technik und Naturwissenschaft, 1999, Max Hueber Verlag, D-85737, ISBN 3-19-001629-1 |       |                                             |      |     |     |
| <b>Languages necessary to complete the course:</b>                                                                                                                                                                               |       |                                             |      |     |     |
| <b>Notes:</b>                                                                                                                                                                                                                    |       |                                             |      |     |     |
| <b>Past grade distribution</b><br>Total number of evaluated students: 148                                                                                                                                                        |       |                                             |      |     |     |
| A                                                                                                                                                                                                                                | B     | C                                           | D    | E   | FX  |
| 38,51                                                                                                                                                                                                                            | 27,03 | 22,3                                        | 6,76 | 2,7 | 2,7 |
| <b>Lecturers:</b> Mgr. Pavel Vilášek, Mgr. Alexandra Maďarová                                                                                                                                                                    |       |                                             |      |     |     |
| <b>Last change:</b> 02.06.2015                                                                                                                                                                                                   |       |                                             |      |     |     |
| <b>Approved by:</b> prof. RNDr. Július Korbaš, CSc.                                                                                                                                                                              |       |                                             |      |     |     |

## COURSE DESCRIPTION

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|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------|---------------------------------------------|-------|------|------|
| <b>University:</b> Comenius University in Bratislava                                                                                                                                                                                                              |       |                                             |       |      |      |
| <b>Faculty:</b> Faculty of Mathematics, Physics and Informatics                                                                                                                                                                                                   |       |                                             |       |      |      |
| <b>Course ID:</b><br>FMFI.KJP/1-MXX-252/00                                                                                                                                                                                                                        |       | <b>Course title:</b><br>German Language (4) |       |      |      |
| <b>Educational activities:</b><br><b>Type of activities:</b> practicals<br><b>Number of hours:</b><br><b>per week: 2 per level/semester: 28</b><br><b>Form of the course:</b> on-site learning                                                                    |       |                                             |       |      |      |
| <b>Number of credits:</b> 2                                                                                                                                                                                                                                       |       |                                             |       |      |      |
| <b>Recommended semester:</b> 4.                                                                                                                                                                                                                                   |       |                                             |       |      |      |
| <b>Educational level:</b> I., II.                                                                                                                                                                                                                                 |       |                                             |       |      |      |
| <b>Prerequisites:</b>                                                                                                                                                                                                                                             |       |                                             |       |      |      |
| <b>Course requirements:</b>                                                                                                                                                                                                                                       |       |                                             |       |      |      |
| <b>Learning outcomes:</b>                                                                                                                                                                                                                                         |       |                                             |       |      |      |
| <b>Class syllabus:</b><br>The subject continues the program of German language (3). It provides a course of intermediate and advanced German language.                                                                                                            |       |                                             |       |      |      |
| <b>Recommended literature:</b><br>Vilášek, P.: Nemčina pre študentov FMFI, Na webovej stránke autora v elektronickej podobe.<br>Vilma Václavíková: Nemčina pre študentov MFF UK, Vysokoškolský učebný text pre potrebu študentov KJP, č. 9793/1982 C VIII/2, 1983 |       |                                             |       |      |      |
| <b>Languages necessary to complete the course:</b>                                                                                                                                                                                                                |       |                                             |       |      |      |
| <b>Notes:</b>                                                                                                                                                                                                                                                     |       |                                             |       |      |      |
| <b>Past grade distribution</b><br>Total number of evaluated students: 78                                                                                                                                                                                          |       |                                             |       |      |      |
| A                                                                                                                                                                                                                                                                 | B     | C                                           | D     | E    | FX   |
| 35,9                                                                                                                                                                                                                                                              | 28,21 | 14,1                                        | 12,82 | 3,85 | 5,13 |
| <b>Lecturers:</b> Mgr. Pavel Vilášek, Mgr. Alexandra Maďarová                                                                                                                                                                                                     |       |                                             |       |      |      |
| <b>Last change:</b> 02.06.2015                                                                                                                                                                                                                                    |       |                                             |       |      |      |
| <b>Approved by:</b> prof. RNDr. Július Korbaš, CSc.                                                                                                                                                                                                               |       |                                             |       |      |      |

## COURSE DESCRIPTION

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| <b>University:</b> Comenius University in Bratislava                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                                                       |
| <b>Faculty:</b> Faculty of Mathematics, Physics and Informatics                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                                                       |
| <b>Course ID:</b><br>FMFL.KAGDM/2-<br>MPG-112/00                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | <b>Course title:</b><br>Image Processing and Encoding |
| <b>Educational activities:</b><br><b>Type of activities:</b> lecture<br><b>Number of hours:</b><br><b>per week:</b> 2 <b>per level/semester:</b> 28<br><b>Form of the course:</b> on-site learning                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |                                                       |
| <b>Number of credits:</b> 3                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                                                       |
| <b>Recommended semester:</b> 2.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                                                       |
| <b>Educational level:</b> II.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |                                                       |
| <b>Prerequisites:</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |                                                       |
| <b>Course requirements:</b><br>Scale of assessment (preliminary/final): 40/60                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |                                                       |
| <b>Learning outcomes:</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                                                       |
| <b>Class syllabus:</b><br>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. Lossless image encoding – the principle and basic methods. Lossy image encoding – the principle and basic methods. Some problems connected with the errors of the transmitted encoded image. |                                                       |
| <b>Recommended literature:</b><br>Kódování / Jiří Adámek. Praha : Státní nakladatelství technické literatury, 1989<br>Vybrané metódy kompresie dát : Kódovanie obrazov / Jaroslav Polec, Tatiana Karlubíková, Miloš Oravec a kol.. Bratislava : Fakulta matematiky, fyziky a informatiky UK, 2000<br>Digital image processing / Rafael C. Gonzalez, Richard E. Woods. Beijing : Pearson education Asia : Publishing House of Electronics Industry, 2010<br>Digital study materials by the lecturer, published online at the class web-page.                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                                                       |
| <b>Languages necessary to complete the course:</b><br>Slovak and English                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                                                       |
| <b>Notes:</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |                                                       |

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|-----------------------------------------------------|------|-----|-----|------|-----|
| <b>Past grade distribution</b>                      |      |     |     |      |     |
| Total number of evaluated students: 120             |      |     |     |      |     |
| A                                                   | B    | C   | D   | E    | FX  |
| 84,17                                               | 12,5 | 2,5 | 0,0 | 0,83 | 0,0 |
| <b>Lecturers:</b> prof. Ing. Jaroslav Polec, CSc.   |      |     |     |      |     |
| <b>Last change:</b> 03.09.2015                      |      |     |     |      |     |
| <b>Approved by:</b> prof. RNDr. Július Korbaš, CSc. |      |     |     |      |     |

## COURSE DESCRIPTION

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|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------|--------------------------------------------------------------|-------|------|-------|
| <b>University:</b> Comenius University in Bratislava                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |      |                                                              |       |      |       |
| <b>Faculty:</b> Faculty of Mathematics, Physics and Informatics                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |      |                                                              |       |      |       |
| <b>Course ID:</b><br>FMFI.KAGDM/2-MPG-115/10                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |      | <b>Course title:</b><br>Modelling of Curves and Surfaces (1) |       |      |       |
| <b>Educational activities:</b><br><b>Type of activities:</b> lecture / practicals<br><b>Number of hours:</b><br><b>per week:</b> 2 / 2 <b>per level/semester:</b> 28 / 28<br><b>Form of the course:</b> on-site learning                                                                                                                                                                                                                                                                                                                                                                        |      |                                                              |       |      |       |
| <b>Number of credits:</b> 5                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |      |                                                              |       |      |       |
| <b>Recommended semester:</b> 1.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |      |                                                              |       |      |       |
| <b>Educational level:</b> II.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |      |                                                              |       |      |       |
| <b>Prerequisites:</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |      |                                                              |       |      |       |
| <b>Course requirements:</b><br>Scale of assessment (preliminary/final): 40/60                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |      |                                                              |       |      |       |
| <b>Learning outcomes:</b><br>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.                                                                                                                                                                                                                                                                                                               |      |                                                              |       |      |       |
| <b>Class syllabus:</b><br>Bézier curves. Polar forms of polynomial curves.<br>Simple interpolation schemes. Spline curves.<br>B-spline functions and curves, NURBS curves.<br>Selected subdivision curve schemes.                                                                                                                                                                                                                                                                                                                                                                               |      |                                                              |       |      |       |
| <b>Recommended literature:</b><br>Fundamentals of computer aided geometric design / Josef Hoschek, Dieter Lasser ; translated by Larry L. Schumaker. Wellesley : A. K. Peters, 1993<br>Curves and Surfaces for computer-Aided geometric design : A practical Guide / Gerald E. Farin. San Diego : Academic Press, 1997<br>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).<br>The electronic materials of the teacher published via the web-page of the subject. |      |                                                              |       |      |       |
| <b>Languages necessary to complete the course:</b><br>Slovak and English                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |      |                                                              |       |      |       |
| <b>Notes:</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |      |                                                              |       |      |       |
| <b>Past grade distribution</b><br>Total number of evaluated students: 79                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |      |                                                              |       |      |       |
| A                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | B    | C                                                            | D     | E    | FX    |
| 31,65                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | 8,86 | 20,25                                                        | 11,39 | 5,06 | 22,78 |

|                                                        |
|--------------------------------------------------------|
| <b>Lecturers:</b> doc. RNDr. Pavel Chalmovianský, PhD. |
| <b>Last change:</b> 03.09.2015                         |
| <b>Approved by:</b> prof. RNDr. Július Korbaš, CSc.    |

## COURSE DESCRIPTION

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| <b>University:</b> Comenius University in Bratislava                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |      |                                                              |       |      |       |
| <b>Faculty:</b> Faculty of Mathematics, Physics and Informatics                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |      |                                                              |       |      |       |
| <b>Course ID:</b><br>FMFI.KAGDM/2-MPG-215/10                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |      | <b>Course title:</b><br>Modelling of Curves and Surfaces (2) |       |      |       |
| <b>Educational activities:</b><br><b>Type of activities:</b> lecture / practicals<br><b>Number of hours:</b><br><b>per week:</b> 2 / 2 <b>per level/semester:</b> 28 / 28<br><b>Form of the course:</b> on-site learning                                                                                                                                                                                                                                                                                                                                                               |      |                                                              |       |      |       |
| <b>Number of credits:</b> 5                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |      |                                                              |       |      |       |
| <b>Recommended semester:</b> 2.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |      |                                                              |       |      |       |
| <b>Educational level:</b> II.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |      |                                                              |       |      |       |
| <b>Prerequisites:</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |      |                                                              |       |      |       |
| <b>Course requirements:</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |      |                                                              |       |      |       |
| <b>Learning outcomes:</b><br>The students should know, theoretically and practically, basic principles and techniques of construction of piecewise polynomial/rational surfaces, their properties and some ways of modifications of such curves in computer aided geometric design.                                                                                                                                                                                                                                                                                                    |      |                                                              |       |      |       |
| <b>Class syllabus:</b><br>Bézier quadrangular and triangular patches and their polar forms.<br>B-spline surfaces, NURBS-surfaces. Coons quadrangle and triangle interpolation surfaces.<br>Selected subdivision schemes of surface constructions.                                                                                                                                                                                                                                                                                                                                      |      |                                                              |       |      |       |
| <b>Recommended literature:</b><br>Fundamentals of computer aided geometric design / Josef Hoschek, Dieter Lasser ; translated by Larry L. Schumaker. Wellesley : A. K. Peters, 1993<br>Curves and Surfaces for computer-Aided geometric design : A practical Guide / Gerald E. Farin. San Diego : Academic Press, 1997<br>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).<br>The electronic materials of the teacher published via web of the subject. |      |                                                              |       |      |       |
| <b>Languages necessary to complete the course:</b><br>Slovak and English                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |      |                                                              |       |      |       |
| <b>Notes:</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |      |                                                              |       |      |       |
| <b>Past grade distribution</b><br>Total number of evaluated students: 88                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |      |                                                              |       |      |       |
| A                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | B    | C                                                            | D     | E    | FX    |
| 26,14                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | 12,5 | 17,05                                                        | 17,05 | 5,68 | 21,59 |
| <b>Lecturers:</b> doc. RNDr. Pavel Chalmovianský, PhD.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |      |                                                              |       |      |       |
| <b>Last change:</b> 02.09.2015                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |      |                                                              |       |      |       |

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

## COURSE DESCRIPTION

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| <b>University:</b> Comenius University in Bratislava                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |       |                                                              |     |     |       |
| <b>Faculty:</b> Faculty of Mathematics, Physics and Informatics                                                                                                                                                                                                                                                                                                                                                                                                                                                             |       |                                                              |     |     |       |
| <b>Course ID:</b><br>FMFI.KAGDM/2-MPG-216/10                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |       | <b>Course title:</b><br>Modelling of Curves and Surfaces (3) |     |     |       |
| <b>Educational activities:</b><br><b>Type of activities:</b> lecture<br><b>Number of hours:</b><br><b>per week:</b> 2 <b>per level/semester:</b> 28<br><b>Form of the course:</b> on-site learning                                                                                                                                                                                                                                                                                                                          |       |                                                              |     |     |       |
| <b>Number of credits:</b> 3                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |       |                                                              |     |     |       |
| <b>Recommended semester:</b> 3.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |       |                                                              |     |     |       |
| <b>Educational level:</b> II.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |       |                                                              |     |     |       |
| <b>Prerequisites:</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |       |                                                              |     |     |       |
| <b>Course requirements:</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |       |                                                              |     |     |       |
| <b>Learning outcomes:</b><br>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.                                                                                              |       |                                                              |     |     |       |
| <b>Class syllabus:</b><br>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.                                                                                                                                                                                                                                                                                                                    |       |                                                              |     |     |       |
| <b>Recommended literature:</b><br>Fundamentals of computer aided geometric design / Josef Hoschek, Dieter Lasser ; translated by Larry L. Schumaker. Wellesley : A. K. Peters, 1993<br>Wavelets for Computer Graphics: Theory and Applications. Eric J. Stollnitz, Tony D. DeRose, and David H. Salesin. Morgan Kaufmann, San Francisco, 1996.<br>Computing in Euclidean Geometry, Ding-Zhu Du, Frank Hwang, World Scientific, 1995, 492 strán<br>The electronic materials of the teacher published via web of the subject. |       |                                                              |     |     |       |
| <b>Languages necessary to complete the course:</b><br>Slovak and English                                                                                                                                                                                                                                                                                                                                                                                                                                                    |       |                                                              |     |     |       |
| <b>Notes:</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |       |                                                              |     |     |       |
| <b>Past grade distribution</b><br>Total number of evaluated students: 27                                                                                                                                                                                                                                                                                                                                                                                                                                                    |       |                                                              |     |     |       |
| A                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | B     | C                                                            | D   | E   | FX    |
| 66,67                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | 11,11 | 7,41                                                         | 3,7 | 0,0 | 11,11 |
| <b>Lecturers:</b> doc. RNDr. Pavel Chalmovianský, PhD.                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |       |                                                              |     |     |       |

|                                                     |
|-----------------------------------------------------|
| <b>Last change:</b> 02.09.2015                      |
| <b>Approved by:</b> prof. RNDr. Július Korbaš, CSc. |

## COURSE DESCRIPTION

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| <b>University:</b> Comenius University in Bratislava                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                                                              |
| <b>Faculty:</b> Faculty of Mathematics, Physics and Informatics                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                                                              |
| <b>Course ID:</b><br>FMFL.KAGDM/2-<br>MPG-217/10                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | <b>Course title:</b><br>Modelling of Curves and Surfaces (4) |
| <b>Educational activities:</b><br><b>Type of activities:</b> lecture<br><b>Number of hours:</b><br><b>per week:</b> 2 <b>per level/semester:</b> 28<br><b>Form of the course:</b> on-site learning                                                                                                                                                                                                                                                                                                                          |                                                              |
| <b>Number of credits:</b> 3                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |                                                              |
| <b>Recommended semester:</b> 4.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                                                              |
| <b>Educational level:</b> II.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                                                              |
| <b>Prerequisites:</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |                                                              |
| <b>Course requirements:</b><br>Scale of assessment (preliminary/final): 0/100                                                                                                                                                                                                                                                                                                                                                                                                                                               |                                                              |
| <b>Learning outcomes:</b><br>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.                                                                                              |                                                              |
| <b>Class syllabus:</b><br>Curves and surfaces constructed with refinement schemes. Wavelets. Modeling using implicitly defined curves and surfaces. Variational modeling of curves and surfaces. Selected numerical algorithms used for computing of curves and surfaces in CAGD.                                                                                                                                                                                                                                           |                                                              |
| <b>Recommended literature:</b><br>Fundamentals of computer aided geometric design / Josef Hoschek, Dieter Lasser ; translated by Larry L. Schumaker. Wellesley : A. K. Peters, 1993<br>Wavelets for Computer Graphics: Theory and Applications. Eric J. Stollnitz, Tony D. DeRose, and David H. Salesin. Morgan Kaufmann, San Francisco, 1996.<br>Computing in Euclidean Geometry, Ding-Zhu Du, Frank Hwang, World Scientific, 1995, 492 strán<br>The electronic materials of the teacher published via web of the subject. |                                                              |
| <b>Languages necessary to complete the course:</b><br>Slovak and English                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                                                              |
| <b>Notes:</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                                                              |

|                                                        |      |      |     |     |     |
|--------------------------------------------------------|------|------|-----|-----|-----|
| <b>Past grade distribution</b>                         |      |      |     |     |     |
| Total number of evaluated students: 8                  |      |      |     |     |     |
| A                                                      | B    | C    | D   | E   | FX  |
| 75,0                                                   | 12,5 | 12,5 | 0,0 | 0,0 | 0,0 |
| <b>Lecturers:</b> doc. RNDr. Pavel Chalmovianský, PhD. |      |      |     |     |     |
| <b>Last change:</b> 03.09.2015                         |      |      |     |     |     |
| <b>Approved by:</b> prof. RNDr. Július Korbaš, CSc.    |      |      |     |     |     |

## COURSE DESCRIPTION

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| <b>University:</b> Comenius University in Bratislava                                                                                                                                               |     |                                                         |     |     |     |
| <b>Faculty:</b> Faculty of Mathematics, Physics and Informatics                                                                                                                                    |     |                                                         |     |     |     |
| <b>Course ID:</b><br>FMFI.KAI/2-MPG-168/14                                                                                                                                                         |     | <b>Course title:</b><br>Multimedia and Sound Processing |     |     |     |
| <b>Educational activities:</b><br><b>Type of activities:</b> lecture<br><b>Number of hours:</b><br><b>per week:</b> 2 <b>per level/semester:</b> 28<br><b>Form of the course:</b> on-site learning |     |                                                         |     |     |     |
| <b>Number of credits:</b> 3                                                                                                                                                                        |     |                                                         |     |     |     |
| <b>Recommended semester:</b> 2.                                                                                                                                                                    |     |                                                         |     |     |     |
| <b>Educational level:</b> II.                                                                                                                                                                      |     |                                                         |     |     |     |
| <b>Prerequisites:</b>                                                                                                                                                                              |     |                                                         |     |     |     |
| <b>Antirequisites:</b> FMFI.KAI/2-AIN-274/00                                                                                                                                                       |     |                                                         |     |     |     |
| <b>Course requirements:</b>                                                                                                                                                                        |     |                                                         |     |     |     |
| <b>Learning outcomes:</b>                                                                                                                                                                          |     |                                                         |     |     |     |
| <b>Class syllabus:</b>                                                                                                                                                                             |     |                                                         |     |     |     |
| <b>Recommended literature:</b>                                                                                                                                                                     |     |                                                         |     |     |     |
| <b>Languages necessary to complete the course:</b>                                                                                                                                                 |     |                                                         |     |     |     |
| <b>Notes:</b>                                                                                                                                                                                      |     |                                                         |     |     |     |
| <b>Past grade distribution</b><br>Total number of evaluated students: 0                                                                                                                            |     |                                                         |     |     |     |
| A                                                                                                                                                                                                  | B   | C                                                       | D   | E   | FX  |
| 0,0                                                                                                                                                                                                | 0,0 | 0,0                                                     | 0,0 | 0,0 | 0,0 |
| <b>Lecturers:</b> Ľubomír Lúčan, CSc.                                                                                                                                                              |     |                                                         |     |     |     |
| <b>Last change:</b> 02.06.2015                                                                                                                                                                     |     |                                                         |     |     |     |
| <b>Approved by:</b> prof. RNDr. Július Korbaš, CSc.                                                                                                                                                |     |                                                         |     |     |     |

## COURSE DESCRIPTION

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| <b>University:</b> Comenius University in Bratislava                                                                                                                                                                                                                                                                                                                                                                                    |     |                                            |     |     |     |
| <b>Faculty:</b> Faculty of Mathematics, Physics and Informatics                                                                                                                                                                                                                                                                                                                                                                         |     |                                            |     |     |     |
| <b>Course ID:</b><br>FMFI.KAGDM/2-MPG-143/00                                                                                                                                                                                                                                                                                                                                                                                            |     | <b>Course title:</b><br>Multiview Geometry |     |     |     |
| <b>Educational activities:</b><br><b>Type of activities:</b> lecture<br><b>Number of hours:</b><br><b>per week:</b> 2 <b>per level/semester:</b> 28<br><b>Form of the course:</b> on-site learning                                                                                                                                                                                                                                      |     |                                            |     |     |     |
| <b>Number of credits:</b> 3                                                                                                                                                                                                                                                                                                                                                                                                             |     |                                            |     |     |     |
| <b>Recommended semester:</b> 2.                                                                                                                                                                                                                                                                                                                                                                                                         |     |                                            |     |     |     |
| <b>Educational level:</b> II.                                                                                                                                                                                                                                                                                                                                                                                                           |     |                                            |     |     |     |
| <b>Prerequisites:</b>                                                                                                                                                                                                                                                                                                                                                                                                                   |     |                                            |     |     |     |
| <b>Course requirements:</b><br>Scale of assessment (preliminary/final): 100/0                                                                                                                                                                                                                                                                                                                                                           |     |                                            |     |     |     |
| <b>Learning outcomes:</b><br>To acquaint the students with basic methods of scene reconstruction from several images.                                                                                                                                                                                                                                                                                                                   |     |                                            |     |     |     |
| <b>Class syllabus:</b><br>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.                                                                                       |     |                                            |     |     |     |
| <b>Recommended literature:</b><br>Projektívna geometria / Štefan Solčan. Bratislava : MFF UK, 1995<br>Spatial Augmented Reality - Merging Real and Virtual Worlds / Bimber O., Raskar R. , A K Peters, 2005, PDF online na predmetovej stránke.<br>Multiple View Geometry in computer vision /Hartley, R. and Zisserman,R:Cambridge University Press,2000<br>Electronic texts by the teacher, published on the WWW page of the subject. |     |                                            |     |     |     |
| <b>Languages necessary to complete the course:</b><br>Slovak and English                                                                                                                                                                                                                                                                                                                                                                |     |                                            |     |     |     |
| <b>Notes:</b>                                                                                                                                                                                                                                                                                                                                                                                                                           |     |                                            |     |     |     |
| <b>Past grade distribution</b><br>Total number of evaluated students: 15                                                                                                                                                                                                                                                                                                                                                                |     |                                            |     |     |     |
| A                                                                                                                                                                                                                                                                                                                                                                                                                                       | B   | C                                          | D   | E   | FX  |
| 100,0                                                                                                                                                                                                                                                                                                                                                                                                                                   | 0,0 | 0,0                                        | 0,0 | 0,0 | 0,0 |
| <b>Lecturers:</b> doc. RNDr. Valentín Zafko, CSc.                                                                                                                                                                                                                                                                                                                                                                                       |     |                                            |     |     |     |
| <b>Last change:</b> 16.09.2015                                                                                                                                                                                                                                                                                                                                                                                                          |     |                                            |     |     |     |

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

## COURSE DESCRIPTION

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| <b>University:</b> Comenius University in Bratislava                                                                                                                                               |      |                                                        |     |     |     |
| <b>Faculty:</b> Faculty of Mathematics, Physics and Informatics                                                                                                                                    |      |                                                        |     |     |     |
| <b>Course ID:</b><br>FMFI.KAGDM/2-MPG-161/12                                                                                                                                                       |      | <b>Course title:</b><br>Numerical Geometry Seminar (1) |     |     |     |
| <b>Educational activities:</b><br><b>Type of activities:</b> seminar<br><b>Number of hours:</b><br><b>per week:</b> 2 <b>per level/semester:</b> 28<br><b>Form of the course:</b> on-site learning |      |                                                        |     |     |     |
| <b>Number of credits:</b> 2                                                                                                                                                                        |      |                                                        |     |     |     |
| <b>Recommended semester:</b> 1.                                                                                                                                                                    |      |                                                        |     |     |     |
| <b>Educational level:</b> II.                                                                                                                                                                      |      |                                                        |     |     |     |
| <b>Prerequisites:</b>                                                                                                                                                                              |      |                                                        |     |     |     |
| <b>Course requirements:</b>                                                                                                                                                                        |      |                                                        |     |     |     |
| <b>Learning outcomes:</b>                                                                                                                                                                          |      |                                                        |     |     |     |
| <b>Class syllabus:</b>                                                                                                                                                                             |      |                                                        |     |     |     |
| <b>Recommended literature:</b>                                                                                                                                                                     |      |                                                        |     |     |     |
| <b>Languages necessary to complete the course:</b>                                                                                                                                                 |      |                                                        |     |     |     |
| <b>Notes:</b>                                                                                                                                                                                      |      |                                                        |     |     |     |
| <b>Past grade distribution</b><br>Total number of evaluated students: 2                                                                                                                            |      |                                                        |     |     |     |
| A                                                                                                                                                                                                  | B    | C                                                      | D   | E   | FX  |
| 50,0                                                                                                                                                                                               | 50,0 | 0,0                                                    | 0,0 | 0,0 | 0,0 |
| <b>Lecturers:</b> doc. RNDr. Andrej Ferko, PhD.                                                                                                                                                    |      |                                                        |     |     |     |
| <b>Last change:</b> 02.06.2015                                                                                                                                                                     |      |                                                        |     |     |     |
| <b>Approved by:</b> prof. RNDr. Július Korbaš, CSc.                                                                                                                                                |      |                                                        |     |     |     |

## COURSE DESCRIPTION

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| <b>University:</b> Comenius University in Bratislava                                                                                                                                               |     |                                                        |     |     |     |
| <b>Faculty:</b> Faculty of Mathematics, Physics and Informatics                                                                                                                                    |     |                                                        |     |     |     |
| <b>Course ID:</b><br>FMFI.KAGDM/2-MPG-162/12                                                                                                                                                       |     | <b>Course title:</b><br>Numerical Geometry Seminar (2) |     |     |     |
| <b>Educational activities:</b><br><b>Type of activities:</b> seminar<br><b>Number of hours:</b><br><b>per week:</b> 2 <b>per level/semester:</b> 28<br><b>Form of the course:</b> on-site learning |     |                                                        |     |     |     |
| <b>Number of credits:</b> 2                                                                                                                                                                        |     |                                                        |     |     |     |
| <b>Recommended semester:</b> 2.                                                                                                                                                                    |     |                                                        |     |     |     |
| <b>Educational level:</b> II.                                                                                                                                                                      |     |                                                        |     |     |     |
| <b>Prerequisites:</b>                                                                                                                                                                              |     |                                                        |     |     |     |
| <b>Course requirements:</b>                                                                                                                                                                        |     |                                                        |     |     |     |
| <b>Learning outcomes:</b>                                                                                                                                                                          |     |                                                        |     |     |     |
| <b>Class syllabus:</b>                                                                                                                                                                             |     |                                                        |     |     |     |
| <b>Recommended literature:</b>                                                                                                                                                                     |     |                                                        |     |     |     |
| <b>Languages necessary to complete the course:</b>                                                                                                                                                 |     |                                                        |     |     |     |
| <b>Notes:</b>                                                                                                                                                                                      |     |                                                        |     |     |     |
| <b>Past grade distribution</b><br>Total number of evaluated students: 1                                                                                                                            |     |                                                        |     |     |     |
| A                                                                                                                                                                                                  | B   | C                                                      | D   | E   | FX  |
| 100,0                                                                                                                                                                                              | 0,0 | 0,0                                                    | 0,0 | 0,0 | 0,0 |
| <b>Lecturers:</b> doc. RNDr. Andrej Ferko, PhD.                                                                                                                                                    |     |                                                        |     |     |     |
| <b>Last change:</b> 02.06.2015                                                                                                                                                                     |     |                                                        |     |     |     |
| <b>Approved by:</b> prof. RNDr. Július Korbaš, CSc.                                                                                                                                                |     |                                                        |     |     |     |

## COURSE DESCRIPTION

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| <b>University:</b> Comenius University in Bratislava                                                                                                                                                                                                                                                                                                                                                                                                               |      |                                                                     |     |      |     |
| <b>Faculty:</b> Faculty of Mathematics, Physics and Informatics                                                                                                                                                                                                                                                                                                                                                                                                    |      |                                                                     |     |      |     |
| <b>Course ID:</b><br>FMFI.KAGDM+KMANM/2-MPG-243/15                                                                                                                                                                                                                                                                                                                                                                                                                 |      | <b>Course title:</b><br>Numerical Mathematics for Graphic Designers |     |      |     |
| <b>Educational activities:</b><br><b>Type of activities:</b> lecture<br><b>Number of hours:</b><br><b>per week:</b> 3 <b>per level/semester:</b> 42<br><b>Form of the course:</b> on-site learning                                                                                                                                                                                                                                                                 |      |                                                                     |     |      |     |
| <b>Number of credits:</b> 4                                                                                                                                                                                                                                                                                                                                                                                                                                        |      |                                                                     |     |      |     |
| <b>Recommended semester:</b> 2.                                                                                                                                                                                                                                                                                                                                                                                                                                    |      |                                                                     |     |      |     |
| <b>Educational level:</b> II.                                                                                                                                                                                                                                                                                                                                                                                                                                      |      |                                                                     |     |      |     |
| <b>Prerequisites:</b>                                                                                                                                                                                                                                                                                                                                                                                                                                              |      |                                                                     |     |      |     |
| <b>Antirequisites:</b> FMFI.KMANM/2-MPG-243/00                                                                                                                                                                                                                                                                                                                                                                                                                     |      |                                                                     |     |      |     |
| <b>Course requirements:</b>                                                                                                                                                                                                                                                                                                                                                                                                                                        |      |                                                                     |     |      |     |
| <b>Learning outcomes:</b><br>Students become familiar with methods and tools in numerical computing used in higher computer graphics (physical modeling and animation, global illumination problem, special modeling).                                                                                                                                                                                                                                             |      |                                                                     |     |      |     |
| <b>Class syllabus:</b><br>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. |      |                                                                     |     |      |     |
| <b>Recommended literature:</b><br>Matlab / Jela Babušíková. Bratislava : Knižničné a edičné centrum FMFI UK, 2007<br>A first course in numerical analysis / Anthony Ralston. New York : McGraw Hill, 1965                                                                                                                                                                                                                                                          |      |                                                                     |     |      |     |
| <b>Languages necessary to complete the course:</b><br>Slovak and English                                                                                                                                                                                                                                                                                                                                                                                           |      |                                                                     |     |      |     |
| <b>Notes:</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                      |      |                                                                     |     |      |     |
| <b>Past grade distribution</b><br>Total number of evaluated students: 10                                                                                                                                                                                                                                                                                                                                                                                           |      |                                                                     |     |      |     |
| A                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | B    | C                                                                   | D   | E    | FX  |
| 60,0                                                                                                                                                                                                                                                                                                                                                                                                                                                               | 20,0 | 10,0                                                                | 0,0 | 10,0 | 0,0 |
| <b>Lecturers:</b> Mgr. Jela Babušíková, PhD.                                                                                                                                                                                                                                                                                                                                                                                                                       |      |                                                                     |     |      |     |
| <b>Last change:</b> 03.09.2015                                                                                                                                                                                                                                                                                                                                                                                                                                     |      |                                                                     |     |      |     |
| <b>Approved by:</b> prof. RNDr. Július Korbaš, CSc.                                                                                                                                                                                                                                                                                                                                                                                                                |      |                                                                     |     |      |     |

## COURSE DESCRIPTION

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| <b>University:</b> Comenius University in Bratislava                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                                                          |
| <b>Faculty:</b> Faculty of Mathematics, Physics and Informatics                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |                                                          |
| <b>Course ID:</b><br>FMFI.KAGDM/2-MPG-145/15                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | <b>Course title:</b><br>PC Graphics Devices Architecture |
| <b>Educational activities:</b><br><b>Type of activities:</b> lecture<br><b>Number of hours:</b><br><b>per week:</b> 2 <b>per level/semester:</b> 28<br><b>Form of the course:</b> on-site learning                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |                                                          |
| <b>Number of credits:</b> 3                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                                                          |
| <b>Recommended semester:</b> 1.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |                                                          |
| <b>Educational level:</b> II.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                                                          |
| <b>Prerequisites:</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |                                                          |
| <b>Antirequisites:</b> FMFI.KAGDM/2-MPG-145/00                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                                                          |
| <b>Course requirements:</b><br>Preliminary assessment: 100% Continuous assessment, home works, tests<br>Final assessment: 0% Final assessment exam<br>A 90%, B 80%, C 70%, D 60%, E 50%<br>Scale of assessment (preliminary/final): 100/0                                                                                                                                                                                                                                                                                                                                                                                                                               |                                                          |
| <b>Learning outcomes:</b><br>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.                                                                                                                                                                                                                                                                                                                             |                                                          |
| <b>Class syllabus:</b><br>1. Displaying devices (monitors and displays).<br>2. Devices displaying 3D images (stereoscopic and volume displays).<br>3. Projectors technology (LCD, DLP, ...).<br>4. Scanners – types and the principle of their operation.<br>5. Touch screens, digitizers and tablets.<br>6. Printers and plotters.<br>7. Input devices for computer graphics.<br>8. Communication of graphical devices with PC.<br>9. Graphics cards functions.<br>10. OpenGL, DirectX, SDL – API overview.<br>11. Architecture of displaying devices.<br>12. Graphics files formats, compressions.<br>13. The principle of JPEG and MPEG compression and their usage. |                                                          |
| <b>Recommended literature:</b><br>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

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| <b>University:</b> Comenius University in Bratislava                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |                                             |
| <b>Faculty:</b> Faculty of Mathematics, Physics and Informatics                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |                                             |
| <b>Course ID:</b><br>FMFL.KAI/2-AIN-204/10                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | <b>Course title:</b><br>Pattern Recognition |
| <b>Educational activities:</b><br><b>Type of activities:</b> lecture / practicals<br><b>Number of hours:</b><br><b>per week:</b> 2 / 2 <b>per level/semester:</b> 28 / 28<br><b>Form of the course:</b> on-site learning                                                                                                                                                                                                                                                                                                                                                            |                                             |
| <b>Number of credits:</b> 6                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |                                             |
| <b>Recommended semester:</b> 2.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |                                             |
| <b>Educational level:</b> II.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |                                             |
| <b>Prerequisites:</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                                             |
| <b>Course requirements:</b><br>tests, projects, oral exam<br>Scale: A 90%, B 80%, C 70%, D 60%, E 50%<br>Scale of assessment (preliminary/final): 40/60                                                                                                                                                                                                                                                                                                                                                                                                                             |                                             |
| <b>Learning outcomes:</b><br>Graduates will acquire basic methods of classification.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |                                             |
| <b>Class syllabus:</b><br>The role of classification, feature articles and Syntax Notation.<br>Selection and pretreatment symptoms.<br>Classifiers, basic concepts.<br>Bayesian decision theory, discriminatory and divisive functions hypersurface, the criterion of the minimum error.<br>Decision trees.<br>Discriminant analysis, linear classifier.<br>Mechanisms of support vectors (SVM).<br>Neural networks.<br>Uncontrolled classifiers.<br>Hidden Markov models.<br>Quality rating classification.<br>Syntactic recognition, inference grammar. Special types of grammar. |                                             |
| <b>Recommended literature:</b><br>Pattern classification / Richard O. Duda, Peter E. Hart, David G. Stork. New York : Wiley Interscience, 2001<br>Classification pattern recognition and reduction of dimensionality / edited by P. R. Krishnaiah, L. N. Kanal. Amsterdam : North-Holland, 1982<br>Modern multivariate statistical techniques : Regression, classification, and manifold learning / Alan Julian Izenman. New York : Springer, 2008                                                                                                                                  |                                             |
| <b>Languages necessary to complete the course:</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |                                             |
| <b>Notes:</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |                                             |

|                                                                                      |       |       |      |       |       |
|--------------------------------------------------------------------------------------|-------|-------|------|-------|-------|
| <b>Past grade distribution</b>                                                       |       |       |      |       |       |
| Total number of evaluated students: 137                                              |       |       |      |       |       |
| A                                                                                    | B     | C     | D    | E     | FX    |
| 8,76                                                                                 | 17,52 | 27,74 | 21,9 | 12,41 | 11,68 |
| <b>Lecturers:</b> doc. RNDr. Milan Ftáčnik, CSc., RNDr. Zuzana Berger Haladová, PhD. |       |       |      |       |       |
| <b>Last change:</b> 22.09.2017                                                       |       |       |      |       |       |
| <b>Approved by:</b> prof. RNDr. Július Korbaš, CSc.                                  |       |       |      |       |       |

## COURSE DESCRIPTION

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|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|----------------------------------------------------------|-----|-----|-----|
| <b>University:</b> Comenius University in Bratislava                                                                                                                                                                                                                                                                                                                                                 |     |                                                          |     |     |     |
| <b>Faculty:</b> Faculty of Mathematics, Physics and Informatics                                                                                                                                                                                                                                                                                                                                      |     |                                                          |     |     |     |
| <b>Course ID:</b><br>FMFI.KTV/2-MXX-110/00                                                                                                                                                                                                                                                                                                                                                           |     | <b>Course title:</b><br>Physical Education and Sport (1) |     |     |     |
| <b>Educational activities:</b><br><b>Type of activities:</b> practicals<br><b>Number of hours:</b><br><b>per week:</b> 2 <b>per level/semester:</b> 28<br><b>Form of the course:</b> on-site learning                                                                                                                                                                                                |     |                                                          |     |     |     |
| <b>Number of credits:</b> 2                                                                                                                                                                                                                                                                                                                                                                          |     |                                                          |     |     |     |
| <b>Recommended semester:</b> 1.                                                                                                                                                                                                                                                                                                                                                                      |     |                                                          |     |     |     |
| <b>Educational level:</b> II.                                                                                                                                                                                                                                                                                                                                                                        |     |                                                          |     |     |     |
| <b>Prerequisites:</b>                                                                                                                                                                                                                                                                                                                                                                                |     |                                                          |     |     |     |
| <b>Course requirements:</b>                                                                                                                                                                                                                                                                                                                                                                          |     |                                                          |     |     |     |
| <b>Learning outcomes:</b>                                                                                                                                                                                                                                                                                                                                                                            |     |                                                          |     |     |     |
| <b>Class syllabus:</b><br>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. |     |                                                          |     |     |     |
| <b>Recommended literature:</b>                                                                                                                                                                                                                                                                                                                                                                       |     |                                                          |     |     |     |
| <b>Languages necessary to complete the course:</b>                                                                                                                                                                                                                                                                                                                                                   |     |                                                          |     |     |     |
| <b>Notes:</b>                                                                                                                                                                                                                                                                                                                                                                                        |     |                                                          |     |     |     |
| <b>Past grade distribution</b><br>Total number of evaluated students: 1329                                                                                                                                                                                                                                                                                                                           |     |                                                          |     |     |     |
| A                                                                                                                                                                                                                                                                                                                                                                                                    | B   | C                                                        | D   | E   | FX  |
| 99,1                                                                                                                                                                                                                                                                                                                                                                                                 | 0,6 | 0,0                                                      | 0,0 | 0,0 | 0,3 |
| <b>Lecturers:</b> PaedDr. Dana Mašlejová, Mgr. Ladislav Mókus, Mgr. Ondrej Podkonický, doc. PhDr. Vojtech Potočný, CSc., Mgr. Jana Leginusová, Mgr. Tomáš Kuchár, PhD., PaedDr. Mikuláš Ortutay, Mgr. Martin Dovičák, Mgr. Júlia Raábová, PhD., Mgr. Branislav Nedbálek                                                                                                                              |     |                                                          |     |     |     |
| <b>Last change:</b> 02.06.2015                                                                                                                                                                                                                                                                                                                                                                       |     |                                                          |     |     |     |
| <b>Approved by:</b> prof. RNDr. Július Korbaš, CSc.                                                                                                                                                                                                                                                                                                                                                  |     |                                                          |     |     |     |

## COURSE DESCRIPTION

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| <b>University:</b> Comenius University in Bratislava                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |      |                                                          |     |     |      |
| <b>Faculty:</b> Faculty of Mathematics, Physics and Informatics                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |      |                                                          |     |     |      |
| <b>Course ID:</b><br>FMFL.KTV/2-MXX-120/00                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |      | <b>Course title:</b><br>Physical Education and Sport (2) |     |     |      |
| <b>Educational activities:</b><br><b>Type of activities:</b> practicals<br><b>Number of hours:</b><br><b>per week: 2 per level/semester: 28</b><br><b>Form of the course:</b> on-site learning                                                                                                                                                                                                                                                                                                                                                         |      |                                                          |     |     |      |
| <b>Number of credits:</b> 2                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |      |                                                          |     |     |      |
| <b>Recommended semester:</b> 2.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |      |                                                          |     |     |      |
| <b>Educational level:</b> II.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |      |                                                          |     |     |      |
| <b>Prerequisites:</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |      |                                                          |     |     |      |
| <b>Course requirements:</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |      |                                                          |     |     |      |
| <b>Learning outcomes:</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |      |                                                          |     |     |      |
| <b>Class syllabus:</b><br>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. |      |                                                          |     |     |      |
| <b>Recommended literature:</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |      |                                                          |     |     |      |
| <b>Languages necessary to complete the course:</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |      |                                                          |     |     |      |
| <b>Notes:</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |      |                                                          |     |     |      |
| <b>Past grade distribution</b><br>Total number of evaluated students: 1223                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |      |                                                          |     |     |      |
| A                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | B    | C                                                        | D   | E   | FX   |
| 99,84                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | 0,08 | 0,0                                                      | 0,0 | 0,0 | 0,08 |
| <b>Lecturers:</b> Mgr. Martin Dovičák, Mgr. Tomáš Kuchár, PhD., Mgr. Jana Leginusová, PaedDr. Dana Mašlejová, Mgr. Ladislav Mókus, Mgr. Branislav Nedbálek, PaedDr. Mikuláš Ortutay, Mgr. Ondrej Podkonický, doc. PhDr. Vojtech Potočný, CSc., Mgr. Júlia Raábová, PhD.                                                                                                                                                                                                                                                                                |      |                                                          |     |     |      |
| <b>Last change:</b> 02.06.2015                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |      |                                                          |     |     |      |
| <b>Approved by:</b> prof. RNDr. Július Korbaš, CSc.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |      |                                                          |     |     |      |

## COURSE DESCRIPTION

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| <b>University:</b> Comenius University in Bratislava                                                                                                                                                                                                                               |     |                                                          |     |     |     |
| <b>Faculty:</b> Faculty of Mathematics, Physics and Informatics                                                                                                                                                                                                                    |     |                                                          |     |     |     |
| <b>Course ID:</b><br>FMFL.KTV/2-MXX-210/00                                                                                                                                                                                                                                         |     | <b>Course title:</b><br>Physical Education and Sport (3) |     |     |     |
| <b>Educational activities:</b><br><b>Type of activities:</b> practicals<br><b>Number of hours:</b><br><b>per week:</b> 2 <b>per level/semester:</b> 28<br><b>Form of the course:</b> on-site learning                                                                              |     |                                                          |     |     |     |
| <b>Number of credits:</b> 2                                                                                                                                                                                                                                                        |     |                                                          |     |     |     |
| <b>Recommended semester:</b> 3.                                                                                                                                                                                                                                                    |     |                                                          |     |     |     |
| <b>Educational level:</b> II.                                                                                                                                                                                                                                                      |     |                                                          |     |     |     |
| <b>Prerequisites:</b>                                                                                                                                                                                                                                                              |     |                                                          |     |     |     |
| <b>Course requirements:</b>                                                                                                                                                                                                                                                        |     |                                                          |     |     |     |
| <b>Learning outcomes:</b>                                                                                                                                                                                                                                                          |     |                                                          |     |     |     |
| <b>Class syllabus:</b><br>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. |     |                                                          |     |     |     |
| <b>Recommended literature:</b>                                                                                                                                                                                                                                                     |     |                                                          |     |     |     |
| <b>Languages necessary to complete the course:</b>                                                                                                                                                                                                                                 |     |                                                          |     |     |     |
| <b>Notes:</b>                                                                                                                                                                                                                                                                      |     |                                                          |     |     |     |
| <b>Past grade distribution</b><br>Total number of evaluated students: 992                                                                                                                                                                                                          |     |                                                          |     |     |     |
| A                                                                                                                                                                                                                                                                                  | B   | C                                                        | D   | E   | FX  |
| 99,4                                                                                                                                                                                                                                                                               | 0,4 | 0,0                                                      | 0,0 | 0,0 | 0,2 |
| <b>Lecturers:</b> PaedDr. Dana Mašlejová, Mgr. Ladislav Mókus, Mgr. Ondrej Podkonický, doc. PhDr. Vojtech Potočný, CSc., Mgr. Jana Leginusová, Mgr. Tomáš Kuchár, PhD., PaedDr. Mikuláš Ortutay, Mgr. Martin Dovičák, Mgr. Júlia Raábová, PhD., Mgr. Branislav Nedbálek            |     |                                                          |     |     |     |
| <b>Last change:</b> 02.06.2015                                                                                                                                                                                                                                                     |     |                                                          |     |     |     |
| <b>Approved by:</b> prof. RNDr. Július Korbaš, CSc.                                                                                                                                                                                                                                |     |                                                          |     |     |     |

## COURSE DESCRIPTION

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| <b>University:</b> Comenius University in Bratislava                                                                                                                                                                                                                                                 |      |                                                          |     |      |      |
| <b>Faculty:</b> Faculty of Mathematics, Physics and Informatics                                                                                                                                                                                                                                      |      |                                                          |     |      |      |
| <b>Course ID:</b><br>FMFL.KTV/2-MXX-220/00                                                                                                                                                                                                                                                           |      | <b>Course title:</b><br>Physical Education and Sport (4) |     |      |      |
| <b>Educational activities:</b><br><b>Type of activities:</b> practicals<br><b>Number of hours:</b><br><b>per week:</b> 2 <b>per level/semester:</b> 28<br><b>Form of the course:</b> on-site learning                                                                                                |      |                                                          |     |      |      |
| <b>Number of credits:</b> 2                                                                                                                                                                                                                                                                          |      |                                                          |     |      |      |
| <b>Recommended semester:</b> 4.                                                                                                                                                                                                                                                                      |      |                                                          |     |      |      |
| <b>Educational level:</b> II.                                                                                                                                                                                                                                                                        |      |                                                          |     |      |      |
| <b>Prerequisites:</b>                                                                                                                                                                                                                                                                                |      |                                                          |     |      |      |
| <b>Course requirements:</b>                                                                                                                                                                                                                                                                          |      |                                                          |     |      |      |
| <b>Learning outcomes:</b>                                                                                                                                                                                                                                                                            |      |                                                          |     |      |      |
| <b>Class syllabus:</b><br>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. |      |                                                          |     |      |      |
| <b>Recommended literature:</b>                                                                                                                                                                                                                                                                       |      |                                                          |     |      |      |
| <b>Languages necessary to complete the course:</b>                                                                                                                                                                                                                                                   |      |                                                          |     |      |      |
| <b>Notes:</b>                                                                                                                                                                                                                                                                                        |      |                                                          |     |      |      |
| <b>Past grade distribution</b><br>Total number of evaluated students: 868                                                                                                                                                                                                                            |      |                                                          |     |      |      |
| A                                                                                                                                                                                                                                                                                                    | B    | C                                                        | D   | E    | FX   |
| 99,31                                                                                                                                                                                                                                                                                                | 0,46 | 0,0                                                      | 0,0 | 0,12 | 0,12 |
| <b>Lecturers:</b> PaedDr. Dana Mašlejová, Mgr. Ladislav Mókus, Mgr. Ondrej Podkonický, doc. PhDr. Vojtech Potočný, CSc., Mgr. Jana Leginusová, Mgr. Tomáš Kuchár, PhD., PaedDr. Mikuláš Ortutay, Mgr. Martin Dovičák, Mgr. Branislav Nedbálek                                                        |      |                                                          |     |      |      |
| <b>Last change:</b> 02.06.2015                                                                                                                                                                                                                                                                       |      |                                                          |     |      |      |
| <b>Approved by:</b> prof. RNDr. Július Korbaš, CSc.                                                                                                                                                                                                                                                  |      |                                                          |     |      |      |

## COURSE DESCRIPTION

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| <b>University:</b> Comenius University in Bratislava                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |                                              |
| <b>Faculty:</b> Faculty of Mathematics, Physics and Informatics                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |                                              |
| <b>Course ID:</b><br>FMFI.KAGDM/2-MPG-211/15                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | <b>Course title:</b><br>Procedural Modelling |
| <b>Educational activities:</b><br><b>Type of activities:</b> course<br><b>Number of hours:</b><br><b>per week:</b> 2 <b>per level/semester:</b> 28<br><b>Form of the course:</b> on-site learning                                                                                                                                                                                                                                                                                                                                                                 |                                              |
| <b>Number of credits:</b> 3                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |                                              |
| <b>Recommended semester:</b> 3.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |                                              |
| <b>Educational level:</b> II.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |                                              |
| <b>Prerequisites:</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                                              |
| <b>Antirequisites:</b> FMFI.KAI/2-MPG-211/00                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |                                              |
| <b>Course requirements:</b><br>Assessment: evaluation<br>Preliminary assessment: 0% Continuous assessment, tests, projects<br>Final assessment: 100% Evaluation of the student's project<br>Scale of assessment (preliminary/final): 0/100                                                                                                                                                                                                                                                                                                                        |                                              |
| <b>Learning outcomes:</b><br>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.                                                                                                                                                                                                                                                                                                                                                 |                                              |
| <b>Class syllabus:</b> <ol style="list-style-type: none"> <li>1. Pseudorandom sequences generators.</li> <li>2. Procedural creation of 2D and 3D geometry.</li> <li>3. Noises and turbulences.</li> <li>4. Fractals for procedural modelling.</li> <li>5. Georelief and cities modelling.</li> <li>6. Reaction diffusion, biological mechanisms of creation of exodermal patterns.</li> <li>7. Cellular automata, demographic models.</li> <li>8. Procedural textures.</li> <li>9. Particle systems.</li> <li>10. Genetic and evolutionary algorithms.</li> </ol> |                                              |
| <b>Recommended literature:</b><br>Fractals everywhere / Michael F. Barnsley. San Francisco : Morgan Kaufmann, 1993<br>Texturing and Modeling. A procedural approach / David Ebert at al. Morgan Kaufmann, 2002<br>Moodle or course web page with digital texts of the lecturer.                                                                                                                                                                                                                                                                                   |                                              |
| <b>Languages necessary to complete the course:</b><br>Slovak and English                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                                              |
| <b>Notes:</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |                                              |

|                                                     |      |     |       |      |     |
|-----------------------------------------------------|------|-----|-------|------|-----|
| <b>Past grade distribution</b>                      |      |     |       |      |     |
| Total number of evaluated students: 36              |      |     |       |      |     |
| A                                                   | B    | C   | D     | E    | FX  |
| 58,33                                               | 25,0 | 0,0 | 11,11 | 5,56 | 0,0 |
| <b>Lecturers:</b> RNDr. Róbert Bohdal, PhD.         |      |     |       |      |     |
| <b>Last change:</b> 03.09.2015                      |      |     |       |      |     |
| <b>Approved by:</b> prof. RNDr. Július Korbaš, CSc. |      |     |       |      |     |

## COURSE DESCRIPTION

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| <b>University:</b> Comenius University in Bratislava                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |                                             |
| <b>Faculty:</b> Faculty of Mathematics, Physics and Informatics                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                                             |
| <b>Course ID:</b><br>FMFI.KAGDM/2-MPG-141/00                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | <b>Course title:</b><br>Projective Geometry |
| <b>Educational activities:</b><br><b>Type of activities:</b> lecture<br><b>Number of hours:</b><br><b>per week:</b> 2 <b>per level/semester:</b> 28<br><b>Form of the course:</b> on-site learning                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |                                             |
| <b>Number of credits:</b> 3                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |                                             |
| <b>Recommended semester:</b> 1.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                                             |
| <b>Educational level:</b> II.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |                                             |
| <b>Prerequisites:</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |                                             |
| <b>Course requirements:</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |                                             |
| <b>Learning outcomes:</b><br>The graduate learns the fundamentals of projective plane geometry, some consequences of the axioms of projective plane and 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.                                                                                                                                                                     |                                             |
| <b>Class syllabus:</b><br>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.                                                                                                                                                                                                                                                                                                                                                               |                                             |
| <b>Recommended literature:</b><br>Projektívna geometria / Štefan Solčan. Bratislava : MFF UK, 1995<br>The real projective plane / Harold Scott MacDonald Coxeter. Toronto : McGraw-Hill book company, Inc., 1949<br>Foundations of Projective Geometry / Robin Hartshorne, New York: W. A. Benjamin, 1967, dostupne aj na <a href="http://filebox.vt.edu/users/jabrunso/Math/Hartshorne.pdf">http://filebox.vt.edu/users/jabrunso/Math/Hartshorne.pdf</a> , marec 2014<br>Electronic texts of the lecturer published via the web-site of the course.<br>--- available also at <a href="http://filebox.vt.edu/users/jabrunso/Math/Hartshorne.pdf">http://filebox.vt.edu/users/jabrunso/Math/Hartshorne.pdf</a> , March 2014 |                                             |
| <b>Languages necessary to complete the course:</b><br>Slovak and English                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |                                             |
| <b>Notes:</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |                                             |

|                                                     |       |      |      |      |     |
|-----------------------------------------------------|-------|------|------|------|-----|
| <b>Past grade distribution</b>                      |       |      |      |      |     |
| Total number of evaluated students: 82              |       |      |      |      |     |
| A                                                   | B     | C    | D    | E    | FX  |
| 56,1                                                | 29,27 | 8,54 | 4,88 | 1,22 | 0,0 |
| <b>Lecturers:</b> doc. RNDr. Štefan Solčan, CSc.    |       |      |      |      |     |
| <b>Last change:</b> 02.09.2015                      |       |      |      |      |     |
| <b>Approved by:</b> prof. RNDr. Július Korbaš, CSc. |       |      |      |      |     |

## COURSE DESCRIPTION

|                                                                                                                                                                                                       |      |                                              |      |      |     |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------|----------------------------------------------|------|------|-----|
| <b>University:</b> Comenius University in Bratislava                                                                                                                                                  |      |                                              |      |      |     |
| <b>Faculty:</b> Faculty of Mathematics, Physics and Informatics                                                                                                                                       |      |                                              |      |      |     |
| <b>Course ID:</b><br>FMFL.KJP/1-MXX-161/00                                                                                                                                                            |      | <b>Course title:</b><br>Russian Language (1) |      |      |     |
| <b>Educational activities:</b><br><b>Type of activities:</b> practicals<br><b>Number of hours:</b><br><b>per week:</b> 2 <b>per level/semester:</b> 28<br><b>Form of the course:</b> on-site learning |      |                                              |      |      |     |
| <b>Number of credits:</b> 2                                                                                                                                                                           |      |                                              |      |      |     |
| <b>Recommended semester:</b> 1.                                                                                                                                                                       |      |                                              |      |      |     |
| <b>Educational level:</b> I., II.                                                                                                                                                                     |      |                                              |      |      |     |
| <b>Prerequisites:</b>                                                                                                                                                                                 |      |                                              |      |      |     |
| <b>Course requirements:</b>                                                                                                                                                                           |      |                                              |      |      |     |
| <b>Learning outcomes:</b>                                                                                                                                                                             |      |                                              |      |      |     |
| <b>Class syllabus:</b><br>The subject provides a course in Russian language for beginners.                                                                                                            |      |                                              |      |      |     |
| <b>Recommended literature:</b><br>The textbook has not been published. It is at students' disposal in an electronic format.                                                                           |      |                                              |      |      |     |
| <b>Languages necessary to complete the course:</b>                                                                                                                                                    |      |                                              |      |      |     |
| <b>Notes:</b>                                                                                                                                                                                         |      |                                              |      |      |     |
| <b>Past grade distribution</b><br>Total number of evaluated students: 642                                                                                                                             |      |                                              |      |      |     |
| A                                                                                                                                                                                                     | B    | C                                            | D    | E    | FX  |
| 60,9                                                                                                                                                                                                  | 16,2 | 9,66                                         | 4,83 | 1,71 | 6,7 |
| <b>Lecturers:</b> PhDr. Elena Klátiková                                                                                                                                                               |      |                                              |      |      |     |
| <b>Last change:</b> 02.06.2015                                                                                                                                                                        |      |                                              |      |      |     |
| <b>Approved by:</b> prof. RNDr. Július Korbaš, CSc.                                                                                                                                                   |      |                                              |      |      |     |

## COURSE DESCRIPTION

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|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------|----------------------------------------------|------|------|------|
| <b>University:</b> Comenius University in Bratislava                                                                                                                                                  |      |                                              |      |      |      |
| <b>Faculty:</b> Faculty of Mathematics, Physics and Informatics                                                                                                                                       |      |                                              |      |      |      |
| <b>Course ID:</b><br>FMFL.KJP/1-MXX-162/00                                                                                                                                                            |      | <b>Course title:</b><br>Russian Language (2) |      |      |      |
| <b>Educational activities:</b><br><b>Type of activities:</b> practicals<br><b>Number of hours:</b><br><b>per week:</b> 2 <b>per level/semester:</b> 28<br><b>Form of the course:</b> on-site learning |      |                                              |      |      |      |
| <b>Number of credits:</b> 2                                                                                                                                                                           |      |                                              |      |      |      |
| <b>Recommended semester:</b> 2.                                                                                                                                                                       |      |                                              |      |      |      |
| <b>Educational level:</b> I., II.                                                                                                                                                                     |      |                                              |      |      |      |
| <b>Prerequisites:</b>                                                                                                                                                                                 |      |                                              |      |      |      |
| <b>Course requirements:</b>                                                                                                                                                                           |      |                                              |      |      |      |
| <b>Learning outcomes:</b>                                                                                                                                                                             |      |                                              |      |      |      |
| <b>Class syllabus:</b><br>The subject continues the program of Russian language (1) and provides a course of Russian for beginners.                                                                   |      |                                              |      |      |      |
| <b>Recommended literature:</b><br>The textbook has not been published. It is at students' disposal in an electronic format.                                                                           |      |                                              |      |      |      |
| <b>Languages necessary to complete the course:</b>                                                                                                                                                    |      |                                              |      |      |      |
| <b>Notes:</b>                                                                                                                                                                                         |      |                                              |      |      |      |
| <b>Past grade distribution</b><br>Total number of evaluated students: 389                                                                                                                             |      |                                              |      |      |      |
| A                                                                                                                                                                                                     | B    | C                                            | D    | E    | FX   |
| 65,81                                                                                                                                                                                                 | 16,2 | 9,0                                          | 3,34 | 1,03 | 4,63 |
| <b>Lecturers:</b> PhDr. Elena Klátiková                                                                                                                                                               |      |                                              |      |      |      |
| <b>Last change:</b> 02.06.2015                                                                                                                                                                        |      |                                              |      |      |      |
| <b>Approved by:</b> prof. RNDr. Július Korbaš, CSc.                                                                                                                                                   |      |                                              |      |      |      |

## COURSE DESCRIPTION

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| <b>University:</b> Comenius University in Bratislava                                                                                                                                                          |       |                                              |      |     |      |
| <b>Faculty:</b> Faculty of Mathematics, Physics and Informatics                                                                                                                                               |       |                                              |      |     |      |
| <b>Course ID:</b><br>FMFI.KJP/1-MXX-261/00                                                                                                                                                                    |       | <b>Course title:</b><br>Russian Language (3) |      |     |      |
| <b>Educational activities:</b><br><b>Type of activities:</b> practicals<br><b>Number of hours:</b><br><b>per week:</b> 2 <b>per level/semester:</b> 28<br><b>Form of the course:</b> on-site learning         |       |                                              |      |     |      |
| <b>Number of credits:</b> 2                                                                                                                                                                                   |       |                                              |      |     |      |
| <b>Recommended semester:</b> 3.                                                                                                                                                                               |       |                                              |      |     |      |
| <b>Educational level:</b> I., II.                                                                                                                                                                             |       |                                              |      |     |      |
| <b>Prerequisites:</b>                                                                                                                                                                                         |       |                                              |      |     |      |
| <b>Course requirements:</b>                                                                                                                                                                                   |       |                                              |      |     |      |
| <b>Learning outcomes:</b>                                                                                                                                                                                     |       |                                              |      |     |      |
| <b>Class syllabus:</b><br>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. |       |                                              |      |     |      |
| <b>Recommended literature:</b><br>The textbook has not been published. It is at students' disposal in an electronic format.                                                                                   |       |                                              |      |     |      |
| <b>Languages necessary to complete the course:</b>                                                                                                                                                            |       |                                              |      |     |      |
| <b>Notes:</b>                                                                                                                                                                                                 |       |                                              |      |     |      |
| <b>Past grade distribution</b><br>Total number of evaluated students: 191                                                                                                                                     |       |                                              |      |     |      |
| A                                                                                                                                                                                                             | B     | C                                            | D    | E   | FX   |
| 70,68                                                                                                                                                                                                         | 17,28 | 8,38                                         | 2,62 | 0,0 | 1,05 |
| <b>Lecturers:</b> PhDr. Elena Klátiková                                                                                                                                                                       |       |                                              |      |     |      |
| <b>Last change:</b> 02.06.2015                                                                                                                                                                                |       |                                              |      |     |      |
| <b>Approved by:</b> prof. RNDr. Július Korbaš, CSc.                                                                                                                                                           |       |                                              |      |     |      |

## COURSE DESCRIPTION

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|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------|----------------------------------------------|------|------|------|
| <b>University:</b> Comenius University in Bratislava                                                                                                                                                          |       |                                              |      |      |      |
| <b>Faculty:</b> Faculty of Mathematics, Physics and Informatics                                                                                                                                               |       |                                              |      |      |      |
| <b>Course ID:</b><br>FMFL.KJP/1-MXX-262/00                                                                                                                                                                    |       | <b>Course title:</b><br>Russian Language (4) |      |      |      |
| <b>Educational activities:</b><br><b>Type of activities:</b> practicals<br><b>Number of hours:</b><br><b>per week:</b> 2 <b>per level/semester:</b> 28<br><b>Form of the course:</b> on-site learning         |       |                                              |      |      |      |
| <b>Number of credits:</b> 2                                                                                                                                                                                   |       |                                              |      |      |      |
| <b>Recommended semester:</b> 4.                                                                                                                                                                               |       |                                              |      |      |      |
| <b>Educational level:</b> I., II.                                                                                                                                                                             |       |                                              |      |      |      |
| <b>Prerequisites:</b>                                                                                                                                                                                         |       |                                              |      |      |      |
| <b>Course requirements:</b>                                                                                                                                                                                   |       |                                              |      |      |      |
| <b>Learning outcomes:</b>                                                                                                                                                                                     |       |                                              |      |      |      |
| <b>Class syllabus:</b><br>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. |       |                                              |      |      |      |
| <b>Recommended literature:</b><br>The textbook has not been published. It is at students' disposal in an electronic format.                                                                                   |       |                                              |      |      |      |
| <b>Languages necessary to complete the course:</b>                                                                                                                                                            |       |                                              |      |      |      |
| <b>Notes:</b>                                                                                                                                                                                                 |       |                                              |      |      |      |
| <b>Past grade distribution</b><br>Total number of evaluated students: 130                                                                                                                                     |       |                                              |      |      |      |
| A                                                                                                                                                                                                             | B     | C                                            | D    | E    | FX   |
| 73,85                                                                                                                                                                                                         | 13,85 | 7,69                                         | 3,08 | 0,77 | 0,77 |
| <b>Lecturers:</b> PhDr. Elena Klátiková                                                                                                                                                                       |       |                                              |      |      |      |
| <b>Last change:</b> 02.06.2015                                                                                                                                                                                |       |                                              |      |      |      |
| <b>Approved by:</b> prof. RNDr. Július Korbaš, CSc.                                                                                                                                                           |       |                                              |      |      |      |

## COURSE DESCRIPTION

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| <b>University:</b> Comenius University in Bratislava                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |                                                                  |
| <b>Faculty:</b> Faculty of Mathematics, Physics and Informatics                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |                                                                  |
| <b>Course ID:</b><br>FMFI.KAGDM/2-MPG-205/00                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | <b>Course title:</b><br>Seminar in Computer Physics and Geometry |
| <b>Educational activities:</b><br><b>Type of activities:</b> seminar<br><b>Number of hours:</b><br><b>per week:</b> 2 <b>per level/semester:</b> 28<br><b>Form of the course:</b> on-site learning                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |                                                                  |
| <b>Number of credits:</b> 2                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |                                                                  |
| <b>Recommended semester:</b> 4.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |                                                                  |
| <b>Educational level:</b> II.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |                                                                  |
| <b>Prerequisites:</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                                                                  |
| <b>Course requirements:</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |                                                                  |
| <b>Learning outcomes:</b><br>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.                                                                                                                                                                                                                                                                                                                                                                                                                       |                                                                  |
| <b>Class syllabus:</b><br>Introductory lectures on scientific methodology in general, and in geometry and graphics in particular (observation, experiment etc.).<br>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. |                                                                  |
| <b>Recommended literature:</b><br>Fundamentals of interactive computer graphics / James D. Foley, Andries van Dam. Reading : Addison-Wesley, 1983<br>Real-time rendering / Tomas Akenine-Möller, Eric Haines, Naty Hoffman. Wellesley : A. K. Peters, 2008<br>Curves and Surfaces for computer-Aided geometric design : A practical Guide / Gerald E. Farin. San Diego : Academic Press, 1997<br>Recent papers on the geometric modeling research, computer graphics, computer vision and selected applications, especially from <a href="http://kesen.realtimerendering.com">kesen.realtimerendering.com</a>                                                                                                                     |                                                                  |
| <b>Languages necessary to complete the course:</b><br>Slovak and English                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                                                                  |
| <b>Notes:</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |                                                                  |

|                                                     |     |      |     |      |      |
|-----------------------------------------------------|-----|------|-----|------|------|
| <b>Past grade distribution</b>                      |     |      |     |      |      |
| Total number of evaluated students: 124             |     |      |     |      |      |
| A                                                   | B   | C    | D   | E    | FX   |
| 92,74                                               | 0,0 | 0,81 | 0,0 | 0,81 | 5,65 |
| <b>Lecturers:</b> doc. RNDr. Andrej Ferko, PhD.     |     |      |     |      |      |
| <b>Last change:</b> 02.09.2015                      |     |      |     |      |      |
| <b>Approved by:</b> prof. RNDr. Július Korbaš, CSc. |     |      |     |      |      |

## COURSE DESCRIPTION

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|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|----------------------------------------------|-----|-----|-----|
| <b>University:</b> Comenius University in Bratislava                                                                                                                           |     |                                              |     |     |     |
| <b>Faculty:</b> Faculty of Mathematics, Physics and Informatics                                                                                                                |     |                                              |     |     |     |
| <b>Course ID:</b><br>FMFL.KTV/1-MXX-115/15                                                                                                                                     |     | <b>Course title:</b><br>Sports in Nature (1) |     |     |     |
| <b>Educational activities:</b><br><b>Type of activities:</b><br><b>Number of hours:</b><br><b>per week: per level/semester:</b><br><b>Form of the course:</b> on-site learning |     |                                              |     |     |     |
| <b>Number of credits:</b> 2                                                                                                                                                    |     |                                              |     |     |     |
| <b>Recommended semester:</b> 1.                                                                                                                                                |     |                                              |     |     |     |
| <b>Educational level:</b> I., II.                                                                                                                                              |     |                                              |     |     |     |
| <b>Prerequisites:</b>                                                                                                                                                          |     |                                              |     |     |     |
| <b>Course requirements:</b>                                                                                                                                                    |     |                                              |     |     |     |
| <b>Learning outcomes:</b>                                                                                                                                                      |     |                                              |     |     |     |
| <b>Class syllabus:</b>                                                                                                                                                         |     |                                              |     |     |     |
| <b>Recommended literature:</b>                                                                                                                                                 |     |                                              |     |     |     |
| <b>Languages necessary to complete the course:</b>                                                                                                                             |     |                                              |     |     |     |
| <b>Notes:</b>                                                                                                                                                                  |     |                                              |     |     |     |
| <b>Past grade distribution</b><br>Total number of evaluated students: 171                                                                                                      |     |                                              |     |     |     |
| A                                                                                                                                                                              | B   | C                                            | D   | E   | FX  |
| 99,42                                                                                                                                                                          | 0,0 | 0,58                                         | 0,0 | 0,0 | 0,0 |
| <b>Lecturers:</b> Mgr. Martin Dovičák, Mgr. Tomáš Kuchár, PhD., Mgr. Jana Leginusová, PaedDr. Dana Mašlejová, Mgr. Ladislav Mókus, Mgr. Ondrej Podkonický                      |     |                                              |     |     |     |
| <b>Last change:</b> 25.05.2016                                                                                                                                                 |     |                                              |     |     |     |
| <b>Approved by:</b> prof. RNDr. Július Korbaš, CSc.                                                                                                                            |     |                                              |     |     |     |

## COURSE DESCRIPTION

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|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|----------------------------------------------|-----|-----|-----|
| <b>University:</b> Comenius University in Bratislava                                                                                                                                  |     |                                              |     |     |     |
| <b>Faculty:</b> Faculty of Mathematics, Physics and Informatics                                                                                                                       |     |                                              |     |     |     |
| <b>Course ID:</b><br>FMFI.KTV/1-MXX-115/15                                                                                                                                            |     | <b>Course title:</b><br>Sports in Nature (1) |     |     |     |
| <b>Educational activities:</b><br><b>Type of activities:</b><br><b>Number of hours:</b><br><b>per week:</b> <b>per level/semester:</b><br><b>Form of the course:</b> on-site learning |     |                                              |     |     |     |
| <b>Number of credits:</b> 2                                                                                                                                                           |     |                                              |     |     |     |
| <b>Recommended semester:</b> 2.                                                                                                                                                       |     |                                              |     |     |     |
| <b>Educational level:</b> I., II.                                                                                                                                                     |     |                                              |     |     |     |
| <b>Prerequisites:</b>                                                                                                                                                                 |     |                                              |     |     |     |
| <b>Course requirements:</b>                                                                                                                                                           |     |                                              |     |     |     |
| <b>Learning outcomes:</b>                                                                                                                                                             |     |                                              |     |     |     |
| <b>Class syllabus:</b>                                                                                                                                                                |     |                                              |     |     |     |
| <b>Recommended literature:</b>                                                                                                                                                        |     |                                              |     |     |     |
| <b>Languages necessary to complete the course:</b>                                                                                                                                    |     |                                              |     |     |     |
| <b>Notes:</b>                                                                                                                                                                         |     |                                              |     |     |     |
| <b>Past grade distribution</b><br>Total number of evaluated students: 171                                                                                                             |     |                                              |     |     |     |
| A                                                                                                                                                                                     | B   | C                                            | D   | E   | FX  |
| 99,42                                                                                                                                                                                 | 0,0 | 0,58                                         | 0,0 | 0,0 | 0,0 |
| <b>Lecturers:</b> Mgr. Martin Dovičák, Mgr. Tomáš Kuchár, PhD., Mgr. Jana Leginusová, PaedDr. Dana Mašlejová, Mgr. Ladislav Mókus, Mgr. Ondrej Podkonický                             |     |                                              |     |     |     |
| <b>Last change:</b> 25.05.2016                                                                                                                                                        |     |                                              |     |     |     |
| <b>Approved by:</b> prof. RNDr. Július Korbaš, CSc.                                                                                                                                   |     |                                              |     |     |     |

## COURSE DESCRIPTION

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|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|----------------------------------------------|-----|-----|-----|
| <b>University:</b> Comenius University in Bratislava                                                                                                                           |     |                                              |     |     |     |
| <b>Faculty:</b> Faculty of Mathematics, Physics and Informatics                                                                                                                |     |                                              |     |     |     |
| <b>Course ID:</b><br>FMFI.KTV/1-MXX-215/15                                                                                                                                     |     | <b>Course title:</b><br>Sports in Nature (2) |     |     |     |
| <b>Educational activities:</b><br><b>Type of activities:</b><br><b>Number of hours:</b><br><b>per week: per level/semester:</b><br><b>Form of the course:</b> on-site learning |     |                                              |     |     |     |
| <b>Number of credits:</b> 2                                                                                                                                                    |     |                                              |     |     |     |
| <b>Recommended semester:</b> 3.                                                                                                                                                |     |                                              |     |     |     |
| <b>Educational level:</b> I., II.                                                                                                                                              |     |                                              |     |     |     |
| <b>Prerequisites:</b>                                                                                                                                                          |     |                                              |     |     |     |
| <b>Course requirements:</b>                                                                                                                                                    |     |                                              |     |     |     |
| <b>Learning outcomes:</b>                                                                                                                                                      |     |                                              |     |     |     |
| <b>Class syllabus:</b>                                                                                                                                                         |     |                                              |     |     |     |
| <b>Recommended literature:</b>                                                                                                                                                 |     |                                              |     |     |     |
| <b>Languages necessary to complete the course:</b>                                                                                                                             |     |                                              |     |     |     |
| <b>Notes:</b>                                                                                                                                                                  |     |                                              |     |     |     |
| <b>Past grade distribution</b><br>Total number of evaluated students: 94                                                                                                       |     |                                              |     |     |     |
| A                                                                                                                                                                              | B   | C                                            | D   | E   | FX  |
| 100,0                                                                                                                                                                          | 0,0 | 0,0                                          | 0,0 | 0,0 | 0,0 |
| <b>Lecturers:</b> Mgr. Martin Dovičák, Mgr. Tomáš Kuchár, PhD., Mgr. Jana Leginusová, PaedDr. Dana Mašlejová, Mgr. Ladislav Mókus, Mgr. Ondrej Podkonický                      |     |                                              |     |     |     |
| <b>Last change:</b> 25.05.2016                                                                                                                                                 |     |                                              |     |     |     |
| <b>Approved by:</b> prof. RNDr. Július Korbaš, CSc.                                                                                                                            |     |                                              |     |     |     |

## COURSE DESCRIPTION

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|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|----------------------------------------------|-----|-----|-----|
| <b>University:</b> Comenius University in Bratislava                                                                                                                           |     |                                              |     |     |     |
| <b>Faculty:</b> Faculty of Mathematics, Physics and Informatics                                                                                                                |     |                                              |     |     |     |
| <b>Course ID:</b><br>FMFL.KTV/1-MXX-215/15                                                                                                                                     |     | <b>Course title:</b><br>Sports in Nature (2) |     |     |     |
| <b>Educational activities:</b><br><b>Type of activities:</b><br><b>Number of hours:</b><br><b>per week: per level/semester:</b><br><b>Form of the course:</b> on-site learning |     |                                              |     |     |     |
| <b>Number of credits:</b> 2                                                                                                                                                    |     |                                              |     |     |     |
| <b>Recommended semester:</b> 4.                                                                                                                                                |     |                                              |     |     |     |
| <b>Educational level:</b> I., II.                                                                                                                                              |     |                                              |     |     |     |
| <b>Prerequisites:</b>                                                                                                                                                          |     |                                              |     |     |     |
| <b>Course requirements:</b>                                                                                                                                                    |     |                                              |     |     |     |
| <b>Learning outcomes:</b>                                                                                                                                                      |     |                                              |     |     |     |
| <b>Class syllabus:</b>                                                                                                                                                         |     |                                              |     |     |     |
| <b>Recommended literature:</b>                                                                                                                                                 |     |                                              |     |     |     |
| <b>Languages necessary to complete the course:</b>                                                                                                                             |     |                                              |     |     |     |
| <b>Notes:</b>                                                                                                                                                                  |     |                                              |     |     |     |
| <b>Past grade distribution</b><br>Total number of evaluated students: 94                                                                                                       |     |                                              |     |     |     |
| A                                                                                                                                                                              | B   | C                                            | D   | E   | FX  |
| 100,0                                                                                                                                                                          | 0,0 | 0,0                                          | 0,0 | 0,0 | 0,0 |
| <b>Lecturers:</b> Mgr. Martin Dovičák, Mgr. Tomáš Kuchár, PhD., Mgr. Jana Leginusová, PaedDr. Dana Mašlejová, Mgr. Ladislav Mókus, Mgr. Ondrej Podkonický                      |     |                                              |     |     |     |
| <b>Last change:</b> 25.05.2016                                                                                                                                                 |     |                                              |     |     |     |
| <b>Approved by:</b> prof. RNDr. Július Korbaš, CSc.                                                                                                                            |     |                                              |     |     |     |

## COURSE DESCRIPTION

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|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------|
| <b>University:</b> Comenius University in Bratislava                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                                                          |
| <b>Faculty:</b> Faculty of Mathematics, Physics and Informatics                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |                                                          |
| <b>Course ID:</b><br>FMFI.KAGDM/2-MPG-105/15                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | <b>Course title:</b><br>Topology and Functional Analysis |
| <b>Educational activities:</b><br><b>Type of activities:</b> course<br><b>Number of hours:</b><br><b>per week:</b> 5 <b>per level/semester:</b> 70<br><b>Form of the course:</b> on-site learning                                                                                                                                                                                                                                                                                                                                                                                |                                                          |
| <b>Number of credits:</b> 7                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |                                                          |
| <b>Recommended semester:</b> 2.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |                                                          |
| <b>Educational level:</b> II.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                                                          |
| <b>Prerequisites:</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                                                          |
| <b>Antirequisites:</b> FMFI.KAGDM/2-MPG-105/00                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |                                                          |
| <b>Course requirements:</b><br>Preliminary assessment: 0%<br>Final assessment: Final evaluation exam 100% (A 90%; B 80%; C 70%; D 60%; E 50%)<br>Scale of assessment (preliminary/final): 0/100                                                                                                                                                                                                                                                                                                                                                                                  |                                                          |
| <b>Learning outcomes:</b><br>The student masters basic constructions and fundamental facts from set-theoretic topology and functional analysis for nonspecialists.                                                                                                                                                                                                                                                                                                                                                                                                               |                                                          |
| <b>Class syllabus:</b><br>Metric topology. Topological spaces. Continuous mappings. Basic constructions of topological spaces. Countability axioms. Separation axioms (T1 – T4). Connectedness. Compactness. Topological manifolds and their discrete representations.<br>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.    |                                                          |
| <b>Recommended literature:</b><br>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<br>Funkcionálna analýza / Ladislav Mišík. Bratislava : Alfa, 1989<br>Topology and geometry / Glen E. Bredon. New York : Springer, 1993<br>Vlastné elektronické texty vyučujúceho predmetu zverejňované prostredníctvom web stránky predmetu.<br>Engelking, Ryszard General topology. Rev. and compl. ed. Sigma Series in Pure Mathematics, 6. Berlin: Heldermann Verlag. viii, 529 p. ,1989. |                                                          |
| <b>Languages necessary to complete the course:</b><br>Slovak and English                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |                                                          |
| <b>Notes:</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                                                          |

|                                                        |       |       |       |       |       |
|--------------------------------------------------------|-------|-------|-------|-------|-------|
| <b>Past grade distribution</b>                         |       |       |       |       |       |
| Total number of evaluated students: 139                |       |       |       |       |       |
| A                                                      | B     | C     | D     | E     | FX    |
| 14,39                                                  | 17,27 | 23,74 | 15,11 | 17,99 | 11,51 |
| <b>Lecturers:</b> doc. RNDr. Pavel Chalmovianský, PhD. |       |       |       |       |       |
| <b>Last change:</b> 03.09.2015                         |       |       |       |       |       |
| <b>Approved by:</b> prof. RNDr. Július Korbaš, CSc.    |       |       |       |       |       |

## COURSE DESCRIPTION

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|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------|------------------------------------------------------|-----|-----|------|
| <b>University:</b> Comenius University in Bratislava                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |       |                                                      |     |     |      |
| <b>Faculty:</b> Faculty of Mathematics, Physics and Informatics                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |       |                                                      |     |     |      |
| <b>Course ID:</b><br>FMFI.KAI+KAGDM/2-AIN-223/15                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |       | <b>Course title:</b><br>Virtual and Extended Reality |     |     |      |
| <b>Educational activities:</b><br><b>Type of activities:</b> lecture / practicals<br><b>Number of hours:</b><br><b>per week:</b> 2 / 2 <b>per level/semester:</b> 28 / 28<br><b>Form of the course:</b> on-site learning                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |       |                                                      |     |     |      |
| <b>Number of credits:</b> 6                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |       |                                                      |     |     |      |
| <b>Recommended semester:</b> 1.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |       |                                                      |     |     |      |
| <b>Educational level:</b> II.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |       |                                                      |     |     |      |
| <b>Prerequisites:</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |       |                                                      |     |     |      |
| <b>Course requirements:</b><br>tests, project, written and oral exam<br>Scale: A 90%, B 80%, C 70%, D 60%, E 50%<br>Scale of assessment (preliminary/final): 40/60                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |       |                                                      |     |     |      |
| <b>Learning outcomes:</b><br>After graduating, students will understand the theoretical foundations and practical skills in creating the team applications in enhanced and virtual reality.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |       |                                                      |     |     |      |
| <b>Class syllabus:</b><br>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) |       |                                                      |     |     |      |
| <b>Recommended literature:</b><br>Real-time rendering / Tomas Akenine-Möller, Eric Haines, Naty Hoffman. Wellesley : A. K. Peters, 2008<br>Vlastné elektronické texty vyučujúceho predmetu zverejňované prostredníctvom web stránky predmetu.                                                                                                                                                                                                                                                                                                                                                                                                                                              |       |                                                      |     |     |      |
| <b>Languages necessary to complete the course:</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |       |                                                      |     |     |      |
| <b>Notes:</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |       |                                                      |     |     |      |
| <b>Past grade distribution</b><br>Total number of evaluated students: 24                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |       |                                                      |     |     |      |
| A                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | B     | C                                                    | D   | E   | FX   |
| 45,83                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | 33,33 | 12,5                                                 | 0,0 | 0,0 | 8,33 |

|                                                                                     |
|-------------------------------------------------------------------------------------|
| <b>Lecturers:</b> doc. RNDr. Andrej Ferko, PhD., RNDr. Zuzana Berger Haladová, PhD. |
| <b>Last change:</b> 23.09.2017                                                      |
| <b>Approved by:</b> prof. RNDr. Július Korbaš, CSc.                                 |

## COURSE DESCRIPTION

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|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|------------------------------------------|-----|------|------|
| <b>University:</b> Comenius University in Bratislava                                                                                                                                                                                                                          |     |                                          |     |      |      |
| <b>Faculty:</b> Faculty of Mathematics, Physics and Informatics                                                                                                                                                                                                               |     |                                          |     |      |      |
| <b>Course ID:</b><br>FMFI.KAGDM/2-MPG-136/15                                                                                                                                                                                                                                  |     | <b>Course title:</b><br>www - New Trends |     |      |      |
| <b>Educational activities:</b><br><b>Type of activities:</b> lecture<br><b>Number of hours:</b><br><b>per week: 2 per level/semester: 28</b><br><b>Form of the course:</b> on-site learning                                                                                   |     |                                          |     |      |      |
| <b>Number of credits:</b> 3                                                                                                                                                                                                                                                   |     |                                          |     |      |      |
| <b>Recommended semester:</b> 2.                                                                                                                                                                                                                                               |     |                                          |     |      |      |
| <b>Educational level:</b> II.                                                                                                                                                                                                                                                 |     |                                          |     |      |      |
| <b>Prerequisites:</b>                                                                                                                                                                                                                                                         |     |                                          |     |      |      |
| <b>Antirequisites:</b> FMFI.KAGDM/2-MPG-136/10                                                                                                                                                                                                                                |     |                                          |     |      |      |
| <b>Course requirements:</b><br>Assessment: evaluation<br>Preliminary assessment: continuous assessment, tests 100%<br>Final assessment: Final evaluation examination 0% (A 90%; B 80%; C 70%; D 60%; E 50%)<br>Scale of assessment (preliminary/final): 100/0                 |     |                                          |     |      |      |
| <b>Learning outcomes:</b>                                                                                                                                                                                                                                                     |     |                                          |     |      |      |
| <b>Class syllabus:</b><br>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. |     |                                          |     |      |      |
| <b>Recommended literature:</b><br>Flash s využitím XML : tvorba dynamických webových stránek / Craig Swann, Greg Caines ; přeložil Martin Slavík. Praha : Grada, 2003<br>Digital study materials by the lecturer, published online at the class web-page.                     |     |                                          |     |      |      |
| <b>Languages necessary to complete the course:</b><br>Slovak and English                                                                                                                                                                                                      |     |                                          |     |      |      |
| <b>Notes:</b>                                                                                                                                                                                                                                                                 |     |                                          |     |      |      |
| <b>Past grade distribution</b><br>Total number of evaluated students: 20                                                                                                                                                                                                      |     |                                          |     |      |      |
| A                                                                                                                                                                                                                                                                             | B   | C                                        | D   | E    | FX   |
| 45,0                                                                                                                                                                                                                                                                          | 5,0 | 5,0                                      | 5,0 | 15,0 | 25,0 |
| <b>Lecturers:</b> RNDr. Stanislav Stanek, PhD.                                                                                                                                                                                                                                |     |                                          |     |      |      |
| <b>Last change:</b> 03.09.2015                                                                                                                                                                                                                                                |     |                                          |     |      |      |
| <b>Approved by:</b> prof. RNDr. Július Korbaš, CSc.                                                                                                                                                                                                                           |     |                                          |     |      |      |