

# CONTENT

|   |    |
|---|----|
| 1. Academic English.....                                    | 3  |
| 2. Algebra I.....   | 5  |
| 3. Algebra II.....  | 6  |
| 4. Algebra III.....   | 7  |
| 5. Automata and formal languages.....                       | 9  |
| 6. Bachelor project.....                                    | 11 |
| 7. Bachelor thesis and its defence.....                     | 12 |
| 8. Bridge fundamentals.....                                 | 13 |
| 9. Communicative Competence in English.....                 | 15 |
| 10. Communicative Grammar in English.....                   | 17 |
| 11. Communicative Grammar in German Language.....           | 18 |
| 12. Complex analysis.....                                   | 19 |
| 13. Computability theory.....                               | 20 |
| 14. Convex programming.....                                 | 21 |
| 15. Cryptographic protocols.....                            | 22 |
| 16. Data analysis.....                                      | 24 |
| 17. Differential equations.....                             | 26 |
| 18. Discrete mathematics I.....                             | 28 |
| 19. Discrete mathematics II.....                            | 30 |
| 20. Discrete mathematics III.....                           | 32 |
| 21. Economic and financial mathematics.....                 | 34 |
| 22. English Language of Natural Science.....                | 36 |
| 23. Financial mathematics.....                              | 38 |
| 24. Function of real variable.....                          | 40 |
| 25. Geometry I.....   | 41 |
| 26. Introduction to Study of Sciences.....                  | 42 |
| 27. Introduction to data analysis.....                      | 43 |
| 28. Introduction to mathematics.....                        | 45 |
| 29. Life insurance.....                                     | 47 |
| 30. Linear and integer programming.....                     | 49 |
| 31. Logic and set theory.....                               | 50 |
| 32. Macroeconomics.....                                     | 51 |
| 33. Math proseminar.....                                    | 52 |
| 34. Mathematical analysis III.....                          | 53 |
| 35. Mathematical analysis IV.....                           | 54 |
| 36. Mathematical analysis of function of real variable..... | 55 |
| 37. Mathematical software.....                              | 56 |
| 38. Mathematical statistics.....                            | 58 |
| 39. Matrix calculus.....                                    | 60 |
| 40. Microeconomics.....                                     | 61 |
| 41. Numerical mathematics.....                              | 62 |
| 42. Practical operations research.....                      | 64 |
| 43. Principles of book-keeping.....                         | 65 |
| 44. Probability theory.....                                 | 67 |
| 45. Programming, algorithms, and complexity.....            | 69 |
| 46. Programming, algorithms, and complexity.....            | 71 |
| 47. Seaside Aerobic Exercise.....                           | 73 |
| 48. Seminar in macroeconomics.....                          | 75 |

|  |    |
|--|----|
| 49. Seminar in microeconomics.....           | 76 |
| 50. Seminar on history of mathematics.....   | 77 |
| 51. Sports Activities I.....                 | 79 |
| 52. Sports Activities II.....                | 81 |
| 53. Sports Activities III.....               | 83 |
| 54. Sports Activities IV.....                | 85 |
| 55. Students scientific conference.....      | 87 |
| 56. Summer Course-Rafting of TISA River..... | 88 |
| 57. Survival Course.....                     | 90 |
| 58. Typographical systems.....               | 92 |

## COURSE INFORMATION LETTER

|   |       |                                      |      |      |       |
|---|-------|--------------------------------------|------|------|-------|
| <b>University:</b> P. J. Šafárik University in Košice   |       |                                      |      |      |       |
| <b>Faculty:</b> Faculty of Science  |       |                                      |      |      |       |
| <b>Course ID:</b> CJP/<br>PFAJAKA/07  |       | <b>Course name:</b> Academic English |      |      |       |
| <b>Course type, scope and the method:</b><br><b>Course type:</b> Practice<br><b>Recommended course-load (hours):</b><br><b>Per week:</b> 2 <b>Per study period:</b> 28<br><b>Course method:</b> combined, present   |       |                                      |      |      |       |
| <b>Number of ECTS credits:</b> 2  |       |                                      |      |      |       |
| <b>Recommended semester/trimester of the course:</b>  |       |                                      |      |      |       |
| <b>Course level:</b> I., II., N   |       |                                      |      |      |       |
| <b>Prerequisites:</b>   |       |                                      |      |      |       |
| <b>Conditions for course completion:</b><br>Combined method of teaching (classroom/distance)<br>Active classroom participation, assignments handed in on time, 2 absences tolerated<br>1 test (10th week), no retake. (in classroom, in case of distance learning due to worsened epidemiological situation – online)<br>Presentation on chosen topic (in case of distance learning - online thorough MS Teams)<br>Final evaluation- average assessment of test (40%), essay (30%) and presentation (30%).<br>Grading scale: A 93-100%, B 86-92%, C 79-85%, D 72-78%, E 65-71%, FX 64% and less |       |                                      |      |      |       |
| <b>Learning outcomes:</b>   |       |                                      |      |      |       |
| <b>Brief outline of the course:</b>   |       |                                      |      |      |       |
| <b>Recommended literature:</b><br>Seal B.: Academic Encounters, CUP, 2002<br>T. Armer :Cambridge English for Scientists, CUP 2011<br>M. McCarthy M., O'Dell F. - Academic Vocabulary in Use, CUP 2008<br>Zemach, D.E, Rumisek, L.A: Academic Writing, Macmillan 2005<br>Olsen, A. : Active Vocabulary, Pearson, 2013<br><a href="http://www.bbclearningenglish.com">www.bbclearningenglish.com</a><br>Cambridge Academic Content Dictionary, CUP, 2009  |       |                                      |      |      |       |
| <b>Course language:</b><br>English language, level B2 according to CEFR.  |       |                                      |      |      |       |
| <b>Notes:</b>   |       |                                      |      |      |       |
| <b>Course assessment</b><br>Total number of assessed students: 380  |       |                                      |      |      |       |
| A   | B     | C                                    | D    | E    | FX    |
| 33.68   | 22.11 | 15.53                                | 10.0 | 6.58 | 12.11 |
| <b>Provides:</b> Mgr. Viktória Mária Slovenská  |       |                                      |      |      |       |
| <b>Date of last modification:</b> 17.09.2020  |       |                                      |      |      |       |

**Approved:**

## COURSE INFORMATION LETTER

|  |       |                               |      |      |       |
|--|-------|-------------------------------|------|------|-------|
| <b>University:</b> P. J. Šafárik University in Košice  |       |                               |      |      |       |
| <b>Faculty:</b> Faculty of Science   |       |                               |      |      |       |
| <b>Course ID:</b> ÚMV/<br>ALGa/10  |       | <b>Course name:</b> Algebra I |      |      |       |
| <b>Course type, scope and the method:</b><br><b>Course type:</b> Lecture / Practice<br><b>Recommended course-load (hours):</b><br><b>Per week:</b> 3 / 3 <b>Per study period:</b> 42 / 42<br><b>Course method:</b> present |       |                               |      |      |       |
| <b>Number of ECTS credits:</b> 7   |       |                               |      |      |       |
| <b>Recommended semester/trimester of the course:</b> 1.  |       |                               |      |      |       |
| <b>Course level:</b> I.  |       |                               |      |      |       |
| <b>Prerequisites:</b>  |       |                               |      |      |       |
| <b>Conditions for course completion:</b><br>According to the results from the semester and in view of the results of the written and oral final exam..   |       |                               |      |      |       |
| <b>Learning outcomes:</b><br>To obtain basic knowledge from number theory concerning divisibility and from linear algebra concerning systems of linear equations. To be able to apply it in concrete exercises.            |       |                               |      |      |       |
| <b>Brief outline of the course:</b><br>Divisibility in $\mathbb{Z}$ . Fields. Systems of linear equations, Gauss elimination. Maps, permutations. Computing with matrices. Determinants, Cramer rule.                      |       |                               |      |      |       |
| <b>Recommended literature:</b><br>T.S Blyth, E.F. Robertson: Basic linear algebra, Springer Verlag, 2001.<br>K. Jänich: Linear algebra, Springer Verlag, 1991.   |       |                               |      |      |       |
| <b>Course language:</b><br>Slovak  |       |                               |      |      |       |
| <b>Notes:</b>  |       |                               |      |      |       |
| <b>Course assessment</b><br>Total number of assessed students: 1279  |       |                               |      |      |       |
| A  | B     | C                             | D    | E    | FX    |
| 11.81  | 11.65 | 19.0                          | 17.9 | 28.3 | 11.34 |
| <b>Provides:</b> prof. RNDr. Danica Studenovská, CSc., RNDr. Igor Fabrici, Dr. rer. nat., RNDr. Lucia Janičková, PhD., RNDr. Simona Rindošová, RNDr. Ivana Varga   |       |                               |      |      |       |
| <b>Date of last modification:</b> 31.01.2019   |       |                               |      |      |       |
| <b>Approved:</b>   |       |                               |      |      |       |

## COURSE INFORMATION LETTER

|   |       |                                |       |       |     |
|---|-------|--------------------------------|-------|-------|-----|
| <b>University:</b> P. J. Šafárik University in Košice   |       |                                |       |       |     |
| <b>Faculty:</b> Faculty of Science  |       |                                |       |       |     |
| <b>Course ID:</b> ÚMV/<br>ALG1b/10  |       | <b>Course name:</b> Algebra II |       |       |     |
| <b>Course type, scope and the method:</b><br><b>Course type:</b> Lecture / Practice<br><b>Recommended course-load (hours):</b><br><b>Per week:</b> 4 / 2 <b>Per study period:</b> 56 / 28<br><b>Course method:</b> present  |       |                                |       |       |     |
| <b>Number of ECTS credits:</b> 7  |       |                                |       |       |     |
| <b>Recommended semester/trimester of the course:</b> 2.   |       |                                |       |       |     |
| <b>Course level:</b> I.   |       |                                |       |       |     |
| <b>Prerequisites:</b> ÚMV/ALGa/10   |       |                                |       |       |     |
| <b>Conditions for course completion:</b><br>Test<br>Exam  |       |                                |       |       |     |
| <b>Learning outcomes:</b><br>To obtain a deeper knowledge on vector spaces, systems of linear equations and affine spaces.  |       |                                |       |       |     |
| <b>Brief outline of the course:</b><br>Vector spaces, subspaces. A basis, a dimension and a characterization of n-dimensional vector spaces. The rank of a matrix, the Frobenius theorem. Homogeneous systems of linear equations, a fundamental solution set. Affine spaces, subspaces and their positions. Convex sets, convex polyhedrons. |       |                                |       |       |     |
| <b>Recommended literature:</b><br>A. F. Beardon: Algebra and Geometry, Cambridge University Press, 2005<br>G. Birkhoff, S. Mac Lane: A Survey of Modern Algebra, New York 1965  |       |                                |       |       |     |
| <b>Course language:</b><br>Slovak   |       |                                |       |       |     |
| <b>Notes:</b>   |       |                                |       |       |     |
| <b>Course assessment</b><br>Total number of assessed students: 121  |       |                                |       |       |     |
| A   | B     | C                              | D     | E     | FX  |
| 13.22   | 13.22 | 15.7                           | 13.22 | 44.63 | 0.0 |
| <b>Provides:</b> RNDr. Lucia Janičková, PhD.  |       |                                |       |       |     |
| <b>Date of last modification:</b> 03.05.2015  |       |                                |       |       |     |
| <b>Approved:</b>  |       |                                |       |       |     |

## COURSE INFORMATION LETTER

|   |      |                                 |       |       |     |
|---|------|---------------------------------|-------|-------|-----|
| <b>University:</b> P. J. Šafárik University in Košice   |      |                                 |       |       |     |
| <b>Faculty:</b> Faculty of Science  |      |                                 |       |       |     |
| <b>Course ID:</b> ÚMV/<br>ALG1c/10  |      | <b>Course name:</b> Algebra III |       |       |     |
| <b>Course type, scope and the method:</b><br><b>Course type:</b> Lecture / Practice<br><b>Recommended course-load (hours):</b><br><b>Per week:</b> 4 / 2 <b>Per study period:</b> 56 / 28<br><b>Course method:</b> present  |      |                                 |       |       |     |
| <b>Number of ECTS credits:</b> 7  |      |                                 |       |       |     |
| <b>Recommended semester/trimester of the course:</b> 3.   |      |                                 |       |       |     |
| <b>Course level:</b> I.   |      |                                 |       |       |     |
| <b>Prerequisites:</b> ÚMV/ALG1b/10  |      |                                 |       |       |     |
| <b>Conditions for course completion:</b><br>Awarded according to continual evaluation, written and oral examination.  |      |                                 |       |       |     |
| <b>Learning outcomes:</b><br>The students learn basic concepts, theorems and methods of linear algebra, at the level necessary for applications in geometry and other parts of mathematics. They obtain knowledge about the fundamentals of group theory and ring theory, and about properties of the polynomial integral domains.  |      |                                 |       |       |     |
| <b>Brief outline of the course:</b><br>- Ring, integral domain. Integral domain of polynomials over a field. Decomposition into irreducible factors. Roots of polynomials.<br>- Linear mappings and their matrices. Operations with linear mappings, matrices of sums and compositions of linear mappings. Regular linear transformations, regular matrices.<br>- Eigenvalues and eigenvectors, similar matrices. Bilinear and quadratic forms.<br>- Groups, subgroups, cyclic groups, normal subgroups, factorization. |      |                                 |       |       |     |
| <b>Recommended literature:</b><br>S. Mac Lane, G. Birkhoff: Algebra, The Macmillan Company, New York, 1964<br>D.A.R. Wallace: Groups, rings and fields, Springer, 1998<br>G. Birkhoff, S. MacLane: Prehľad modernej algebry, Alfa Bratislava, 1979 (in Slovak)<br>T. Katriňák a kol.: Algebra a teoretická aritmetika 1, Alfa Bratislava, 1985 (in Slovak)  |      |                                 |       |       |     |
| <b>Course language:</b><br>Slovak   |      |                                 |       |       |     |
| <b>Notes:</b>   |      |                                 |       |       |     |
| <b>Course assessment</b><br>Total number of assessed students: 118  |      |                                 |       |       |     |
| A   | B    | C                               | D     | E     | FX  |
| 9.32  | 17.8 | 18.64                           | 26.27 | 27.97 | 0.0 |
| <b>Provides:</b> doc. RNDr. Miroslav Ploščica, CSc.   |      |                                 |       |       |     |

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| <b>Date of last modification:</b> 03.05.2015 |
| <b>Approved:</b>                             |



## COURSE INFORMATION LETTER

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|--|---|
| <b>University:</b> P. J. Šafárik University in Košice  |   |
| <b>Faculty:</b> Faculty of Science   |   |
| <b>Course ID:</b> ÚINF/<br>AFJ1a/15  | <b>Course name:</b> Automata and formal languages |
| <b>Course type, scope and the method:</b><br><b>Course type:</b> Lecture / Practice<br><b>Recommended course-load (hours):</b><br><b>Per week:</b> 2 / 1 <b>Per study period:</b> 28 / 14<br><b>Course method:</b> present   |   |
| <b>Number of ECTS credits:</b> 4   |   |
| <b>Recommended semester/trimester of the course:</b> 4.  |   |
| <b>Course level:</b> I.  |   |
| <b>Prerequisites:</b>  |   |
| <b>Conditions for course completion:</b><br>Oral examination.  |   |
| <b>Learning outcomes:</b><br>To provide theoretical background for studying computer science in general, by giving the necessary knowledge in theory of automata.  |   |
| <b>Brief outline of the course:</b><br>1: Chomsky hierarchy of grammars: alphabet, symbol (letter, character), transitive closure, word (string), empty word (empty string), length of a string, concatenation, language, grammar, nonterminal symbol, terminal symbol, initial nonterminal (initial symbol), grammar rule, derivation step, language generated by a grammar, Chomsky hierarchy of grammars - phrase-structure, context sensitive, context free, regular<br>2: Deterministic finite state automata: finite state automaton, state, input symbol, output symbol, initial state, transition function, output function, examples of automata and their graphic representation, generalized transition and output functions and their basic properties<br>3: Reduction of automata I: equivalent automata, minimal (optimal) automaton, reachable state, properties of reachable states, elimination of unreachable states<br>4: Reduction of automata II: equivalent states, k-equivalent states, properties of equivalence and k-equivalence, relation between k-equivalence and (k+1)-equivalence, partitioning the state set into equivalence classes, elimination of equivalent states<br>5: Reduction of automata III: proof of correctness, unambiguity, and optimality of reduced automaton, testing equivalence of two automata<br>6: Deterministic finite state acceptors: basic definitions, language recognized by a finite state acceptor, common properties of acceptors and automata with an output, minimizing a finite state acceptor<br>7: Operations with regular languages: complement, intersection, union, difference, symmetric difference, testing of emptiness, inclusion, equality, and disjointness for regular languages<br>8: Nondeterministic finite state acceptors: definition, transition function, language recognized by a nondeterministic acceptor, elimination of nondeterminism<br>9: epsilon-acceptors: definition, properties, elimination of epsilon-transitions |   |

|  |       |       |       |      |      |
|--|-------|-------|-------|------|------|
| 10: Regular grammars: regular grammar, extended regular grammar, transformation of acceptor to a regular grammar, transformation of extended regular grammar to an epsilon-acceptor<br>11: Regular expressions I: basic properties, transformation of regular expression to an epsilon-acceptor<br>12: Regular expressions II: regular equations, valid algebraic manipulations with regular expressions, solving an equation with a single unknown variable, solving a system of regular equations, transformation of acceptor to a regular expression<br>13: Another constructions: review of transformations among various representations, an example of a direct transformation of a grammar to a regular expression, closure of the class of regular languages under another language operations – concatenation and Kleene star, mirror image<br>14: Another operations: homomorphism and inverse homomorphism, a context-free language that is not regular |       |       |       |      |      |
| <b>Recommended literature:</b><br>J.E. Hopcroft, R.Motwani, J.D. Ullman: Introduction to automata theory, languages, and computation, Addison-Wesley, 2001.<br>J. Shallit: A second course in formal languages and automata theory, Cambridge University press, 2009.<br>M. Sipser: Introduction to the theory of computation, Thomson Course Technology, 2006.  |       |       |       |      |      |
| <b>Course language:</b>  |       |       |       |      |      |
| <b>Notes:</b>  |       |       |       |      |      |
| <b>Course assessment</b><br>Total number of assessed students: 850   |       |       |       |      |      |
| A  | B     | C     | D     | E    | FX   |
| 25.65  | 18.24 | 23.88 | 17.76 | 9.65 | 4.82 |
| <b>Provides:</b> Mgr. Alexander Szabari, PhD., prof. RNDr. Viliam Geffert, DrSc., RNDr. Zuzana Bednárová, PhD.   |       |       |       |      |      |
| <b>Date of last modification:</b> 17.08.2021   |       |       |       |      |      |
| <b>Approved:</b>   |       |       |       |      |      |

## COURSE INFORMATION LETTER

|   |                                      |
|---|--------------------------------------|
| <b>University:</b> P. J. Šafárik University in Košice   |                                      |
| <b>Faculty:</b> Faculty of Science  |                                      |
| <b>Course ID:</b> ÚMV/<br>BKP1/14   | <b>Course name:</b> Bachelor project |
| <b>Course type, scope and the method:</b><br><b>Course type:</b> Practice<br><b>Recommended course-load (hours):</b><br><b>Per week:</b> 1 <b>Per study period:</b> 14<br><b>Course method:</b> present   |                                      |
| <b>Number of ECTS credits:</b> 1  |                                      |
| <b>Recommended semester/trimester of the course:</b> 5.   |                                      |
| <b>Course level:</b> I.   |                                      |
| <b>Prerequisites:</b>   |                                      |
| <b>Conditions for course completion:</b><br>To prepare and present a contribution related to thesis and its topic.  |                                      |
| <b>Learning outcomes:</b><br>To get students familiar with basic knowledge on the form and content of thesis and thesis presentation as well as with the support for its realisation.   |                                      |
| <b>Brief outline of the course:</b><br>Necessary elements and formal aspects of a thesis. WYSIWYG editors, LaTeX, drawing programs. Presentation software, Microsoft PowerPoint and its clones, Beamer. Suggestions for presentation and contribution making. |                                      |
| <b>Recommended literature:</b><br>electronic information sources  |                                      |
| <b>Course language:</b><br>Slovak or English  |                                      |
| <b>Notes:</b>   |                                      |
| <b>Course assessment</b><br>Total number of assessed students: 121  |                                      |
| abs   | n                                    |
| 100.0   | 0.0                                  |
| <b>Provides:</b> doc. RNDr. Dušan Šveda, CSc.   |                                      |
| <b>Date of last modification:</b> 03.05.2015  |                                      |
| <b>Approved:</b>  |                                      |

## COURSE INFORMATION LETTER

|   |       |   |     |      |     |
|---|-------|---|-----|------|-----|
| <b>University:</b> P. J. Šafárik University in Košice   |       |   |     |      |     |
| <b>Faculty:</b> Faculty of Science  |       |   |     |      |     |
| <b>Course ID:</b> ÚMV/<br>BPO/14  |       | <b>Course name:</b> Bachelor thesis and its defence |     |      |     |
| <b>Course type, scope and the method:</b><br><b>Course type:</b><br><b>Recommended course-load (hours):</b><br><b>Per week: Per study period:</b><br><b>Course method:</b> present                      |       |   |     |      |     |
| <b>Number of ECTS credits:</b> 4  |       |   |     |      |     |
| <b>Recommended semester/trimester of the course:</b>  |       |   |     |      |     |
| <b>Course level:</b> I.   |       |   |     |      |     |
| <b>Prerequisites:</b>   |       |   |     |      |     |
| <b>Conditions for course completion:</b><br>Acquiring the required number of credits in the structure defined by the study plan.  |       |   |     |      |     |
| <b>Learning outcomes:</b><br>Evaluation of student's competences with respect to the profile of the graduate.   |       |   |     |      |     |
| <b>Brief outline of the course:</b><br>Presentation of results of the bachelor thesis, answering the questions of the thesis supervisor and answering the questions of members of evaluation committee. |       |   |     |      |     |
| <b>Recommended literature:</b>  |       |   |     |      |     |
| <b>Course language:</b>   |       |   |     |      |     |
| <b>Notes:</b>   |       |   |     |      |     |
| <b>Course assessment</b><br>Total number of assessed students: 81   |       |   |     |      |     |
| A   | B     | C   | D   | E    | FX  |
| 67.9  | 20.99 | 6.17  | 3.7 | 1.23 | 0.0 |
| <b>Provides:</b>  |       |   |     |      |     |
| <b>Date of last modification:</b> 03.05.2015  |       |   |     |      |     |
| <b>Approved:</b>  |       |   |     |      |     |

## COURSE INFORMATION LETTER

|  |   |
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| <b>University:</b> P. J. Šafárik University in Košice  |   |
| <b>Faculty:</b> Faculty of Science   |   |
| <b>Course ID:</b> ÚMV/<br>ZBR/14   | <b>Course name:</b> Bridge fundamentals |
| <b>Course type, scope and the method:</b><br><b>Course type:</b> Practice<br><b>Recommended course-load (hours):</b><br><b>Per week:</b> 2 <b>Per study period:</b> 28<br><b>Course method:</b> present  |   |
| <b>Number of ECTS credits:</b> 2   |   |
| <b>Recommended semester/trimester of the course:</b> 3.  |   |
| <b>Course level:</b> I.  |   |
| <b>Prerequisites:</b>  |   |
| <b>Conditions for course completion:</b><br>Active participation on exercises.   |   |
| <b>Learning outcomes:</b><br>A student gets acquainted with fundamentals of the contract bridge, develops his/her logical thinking and consolidates his/her habits of positive social behaviour.   |   |
| <b>Brief outline of the course:</b><br>Bridge rules.<br>Principles of the bidding system Standard American.<br>Basic techniques of declarer's play.<br>Basic techniques of the defence.<br>Lead conventions, signals.<br>Common bidding conventions.<br>Selected advanced techniques of the card play.<br>Partnership cooperation in the contract bridge.<br>Bridge ethics.  |   |
| <b>Recommended literature:</b><br>T. Menyhért: Kurz bridžu 2013, <a href="http://new.bridgekosice.sk/kurz-bridzu-2013/">http://new.bridgekosice.sk/kurz-bridzu-2013/</a><br>R. Pavlicek: Learn To Play Bridge!, <a href="http://www.rpbridge.net/1a00.htm">http://www.rpbridge.net/1a00.htm</a><br>ACBL SAYC System Booklet, <a href="http://ebookbrowse.net/acbl-sayc-pdf-d201415187">http://ebookbrowse.net/acbl-sayc-pdf-d201415187</a> |   |
| <b>Course language:</b><br>Slovak or English   |   |
| <b>Notes:</b><br>Minimum number of participants is 4.  |   |
| <b>Course assessment</b><br>Total number of assessed students: 25  |   |
| abs  | n                                       |
| 96.0   | 4.0                                     |

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|---|
| <b>Provides:</b> doc. RNDr. Miroslav Ploščica, CSc., prof. RNDr. Mirko Horňák, CSc. |
| <b>Date of last modification:</b> 03.05.2015  |
| <b>Approved:</b>  |

## COURSE INFORMATION LETTER

|  |   |
|--|---|
| <b>University:</b> P. J. Šafárik University in Košice  |   |
| <b>Faculty:</b> Faculty of Science   |   |
| <b>Course ID:</b> CJP/<br>PFAJKKA/07   | <b>Course name:</b> Communicative Competence in English |
| <b>Course type, scope and the method:</b><br><b>Course type:</b> Practice<br><b>Recommended course-load (hours):</b><br><b>Per week:</b> 2 <b>Per study period:</b> 28<br><b>Course method:</b> combined, present  |   |
| <b>Number of ECTS credits:</b> 2   |   |
| <b>Recommended semester/trimester of the course:</b>   |   |
| <b>Course level:</b> I., II., N  |   |
| <b>Prerequisites:</b>  |   |
| <b>Conditions for course completion:</b><br>Active participation in class and completed homework assignments. Students are allowed to miss two classes at the most.<br>Online teaching (MS Teams), in case of an improved epidemiological situation = on-site teaching.<br>2 credit tests (presumably in weeks 6/7 and 12/13) and a short oral presentation in English.<br>The tests will be taken online (MS Teams) during online teaching and in class in case of on-site classes.<br>The presentation will be sent to the course instructor as a video recording.<br>Final evaluation consists of the scores obtained for the 2 tests (70%) and the presentation (30%).<br>Final grade will be calculated as follows: A 93-100 %, B 86-92%, C 79-85%, D 72-78%, E 65-71%, FX 64 % and less.   |   |
| <b>Learning outcomes:</b><br>Uplatnenie a aktívne používanie svojich teoretických vedomostí v praktických komunikačných situáciách. Zdokonalenie jazykových vedomostí a zručností študenta, rečovej, pragmatickej a vecnej kompetencie, predovšetkým zlepšujú komunikáciu, schopnosť prijímať a formulovať výpovede, efektívne vyjadrovať svoje myšlienky ako aj orientovať sa v obsahovom pláne výpovede. Precvičovanie rečových intencií kontaktných (napr. pozdravy, oslovenia, pozvanie, oslovenie), informatívnych (napr. získavanie a podávanie informácií, vyjadrenie priestorových a časových vzťahov), regulačných (napr. prosba, poďakovanie, zákaz, pochvala, súhlas, nesúhlas) a hodnotiacich (napr. vyjadrenie vlastného názoru, stanoviska, želania, emócií). Výsledkom budovania praktickej jazykovej kompetencie majú byť vedomosti a zručnosti zodpovedajúce požiadavkám a kritériám dokumentu Spoločný európsky referenčný rámec pre vyučovanie jazykov. |   |
| <b>Brief outline of the course:</b><br>Rodina, jej formy a problémy<br>Vyjadrovanie pocitov a dojmov<br>Dom, bývanie a budúcnosť<br>Formy a dialekty v anglickom jazyku<br>Život v meste a na vidieku<br>Kolokácie a idiomy, zaužívané slovné spojenia<br>Prázdniny a sviatky vo svete   |   |

|  |       |       |      |      |      |
|--|-------|-------|------|------|------|
| Životné prostredie a ekológia<br>Výnimky zo slovosledu<br>Frázové slovesá a ich použitie<br>Charakteristiky neformálneho diškurzu  |       |       |      |      |      |
| <b>Recommended literature:</b><br>www.bbclearningenglish.com<br>McCarthy M., O'Dell F.: English Vocabulary in Use, Upper-Intermediate. CUP, 1994.<br>Misztal M.: Thematic Vocabulary. SPN, 1998.<br>Fictumova J., Ceccarelli J., Long T.: Angličtina, konverzace pro pokročilé. Barrister and Principal, 2008.<br>Peters S., Gráf T.: Time to practise. Polyglot, 2007.<br>Jones L.: Communicative Grammar Practice. CUP, 1985.<br>Alexander L.G.: Longman English Grammar. Longman, 1988. |       |       |      |      |      |
| <b>Course language:</b><br>English language, B2 level according to CEFR  |       |       |      |      |      |
| <b>Notes:</b>  |       |       |      |      |      |
| <b>Course assessment</b><br>Total number of assessed students: 260   |       |       |      |      |      |
| A  | B     | C     | D    | E    | FX   |
| 40.38  | 22.31 | 18.85 | 8.85 | 6.54 | 3.08 |
| <b>Provides:</b> Mgr. Barbara Mitříková, Mgr. Zuzana Nad'ová   |       |       |      |      |      |
| <b>Date of last modification:</b> 11.02.2021   |       |       |      |      |      |
| <b>Approved:</b>   |       |       |      |      |      |



## COURSE INFORMATION LETTER

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|--|-------|--|------|------|------|
| <b>University:</b> P. J. Šafárik University in Košice  |       |  |      |      |      |
| <b>Faculty:</b> Faculty of Science   |       |  |      |      |      |
| <b>Course ID:</b> CJP/<br>PFAJGA/07  |       | <b>Course name:</b> Communicative Grammar in English |      |      |      |
| <b>Course type, scope and the method:</b><br><b>Course type:</b> Practice<br><b>Recommended course-load (hours):</b><br><b>Per week:</b> 2 <b>Per study period:</b> 28<br><b>Course method:</b> combined, present  |       |  |      |      |      |
| <b>Number of ECTS credits:</b> 2   |       |  |      |      |      |
| <b>Recommended semester/trimester of the course:</b>   |       |  |      |      |      |
| <b>Course level:</b> I., II., N  |       |  |      |      |      |
| <b>Prerequisites:</b>  |       |  |      |      |      |
| <b>Conditions for course completion:</b><br>Active classroom participation (max. 2x90 min. absences tolerated). 2 test (5th/6th and 12/13th week), no retake. Final evaluation- average assessment of tests. Grading scale: A 93-100%, B 86-92%, C 79-85%, D 72-78%, E 65-71%, FX 64% and less.  |       |  |      |      |      |
| <b>Learning outcomes:</b>  |       |  |      |      |      |
| <b>Brief outline of the course:</b>  |       |  |      |      |      |
| <b>Recommended literature:</b><br>Vince M.: Macmillan Grammar in Context, Macmillan, 2008<br>McCarthy, O'Dell: English Vocabulary in Use, CUP, 1994<br>C. Oxengen, C. Latham-Koenig: New English File Advanced, Oxford 2010<br>Misztal M.: Thematic Vocabulary, Fragment, 1998<br><a href="http://www.bbclearningenglish.com">www.bbclearningenglish.com</a><br><a href="http://ted.com/talks">ted.com/talks</a> |       |  |      |      |      |
| <b>Course language:</b>  |       |  |      |      |      |
| <b>Notes:</b>  |       |  |      |      |      |
| <b>Course assessment</b><br>Total number of assessed students: 406   |       |  |      |      |      |
| A  | B     | C  | D    | E    | FX   |
| 39.66  | 18.97 | 16.75  | 8.62 | 5.91 | 10.1 |
| <b>Provides:</b> Mgr. Lenka Klimčáková   |       |  |      |      |      |
| <b>Date of last modification:</b> 14.09.2019   |       |  |      |      |      |
| <b>Approved:</b>   |       |  |      |      |      |

## COURSE INFORMATION LETTER

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|---|-------|--|-----|------|------|
| <b>University:</b> P. J. Šafárik University in Košice   |       |  |     |      |      |
| <b>Faculty:</b> Faculty of Science  |       |  |     |      |      |
| <b>Course ID:</b> KGER/<br>NJKG/07  |       | <b>Course name:</b> Communicative Grammar in German Language |     |      |      |
| <b>Course type, scope and the method:</b><br><b>Course type:</b> Practice<br><b>Recommended course-load (hours):</b><br><b>Per week:</b> 2 <b>Per study period:</b> 28<br><b>Course method:</b> present |       |  |     |      |      |
| <b>Number of ECTS credits:</b> 2  |       |  |     |      |      |
| <b>Recommended semester/trimester of the course:</b>  |       |  |     |      |      |
| <b>Course level:</b> I., II.  |       |  |     |      |      |
| <b>Prerequisites:</b>   |       |  |     |      |      |
| <b>Conditions for course completion:</b>  |       |  |     |      |      |
| <b>Learning outcomes:</b>   |       |  |     |      |      |
| <b>Brief outline of the course:</b>   |       |  |     |      |      |
| <b>Recommended literature:</b>  |       |  |     |      |      |
| <b>Course language:</b>   |       |  |     |      |      |
| <b>Notes:</b>   |       |  |     |      |      |
| <b>Course assessment</b><br>Total number of assessed students: 54   |       |  |     |      |      |
| A   | B     | C  | D   | E    | FX   |
| 59.26   | 11.11 | 9.26   | 3.7 | 9.26 | 7.41 |
| <b>Provides:</b> Mgr. Blanka Jenčíková  |       |  |     |      |      |
| <b>Date of last modification:</b> 03.05.2015  |       |  |     |      |      |
| <b>Approved:</b>  |       |  |     |      |      |

## COURSE INFORMATION LETTER

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|---|------|--------------------------------------|------|-------|-------|
| <b>University:</b> P. J. Šafárik University in Košice   |      |                                      |      |       |       |
| <b>Faculty:</b> Faculty of Science  |      |                                      |      |       |       |
| <b>Course ID:</b> ÚMV/<br>FKP/10  |      | <b>Course name:</b> Complex analysis |      |       |       |
| <b>Course type, scope and the method:</b><br><b>Course type:</b> Lecture / Practice<br><b>Recommended course-load (hours):</b><br><b>Per week:</b> 3 / 1 <b>Per study period:</b> 42 / 14<br><b>Course method:</b> present  |      |                                      |      |       |       |
| <b>Number of ECTS credits:</b> 5  |      |                                      |      |       |       |
| <b>Recommended semester/trimester of the course:</b> 6.   |      |                                      |      |       |       |
| <b>Course level:</b> I.   |      |                                      |      |       |       |
| <b>Prerequisites:</b> ÚMV/MAN1c/10 and leboÚMV/MAN2d/10 and leboÚMV/FRPb/19   |      |                                      |      |       |       |
| <b>Conditions for course completion:</b><br>Two written test during semester and activity student to practice. Final evaluation is given by continuous assessment, written and oral part of the exam.   |      |                                      |      |       |       |
| <b>Learning outcomes:</b><br>The purpose of the course is to provide introductory knowledge in differential and integral calculus of complex functions and develop the ability to use this theory.  |      |                                      |      |       |       |
| <b>Brief outline of the course:</b><br>Complex numbers, complex sequences and series. Function of a complex variable - limits, continuity, differentiability, Cauchy-Riemann equations. Integration in the complex plane - Cauchy's theorems and its consequences. Laurent's series, residues and Cauchy's residue theorem. Laplace and Fourier transform and their applications. |      |                                      |      |       |       |
| <b>Recommended literature:</b><br>1. Priestley, H.A.: Introduction to Complex Analysis. Oxford University Press, Oxford, 2004.<br>2. Sveshnikov, A. - Tikhonov, A.: The Theory of Functions of a Complex Variable. Mir Publishers, Moscow, 1973.  |      |                                      |      |       |       |
| <b>Course language:</b><br>Slovak   |      |                                      |      |       |       |
| <b>Notes:</b>   |      |                                      |      |       |       |
| <b>Course assessment</b><br>Total number of assessed students: 49   |      |                                      |      |       |       |
| A   | B    | C                                    | D    | E     | FX    |
| 16.33   | 6.12 | 28.57                                | 10.2 | 24.49 | 14.29 |
| <b>Provides:</b> doc. RNDr. Ondrej Hutník, PhD.   |      |                                      |      |       |       |
| <b>Date of last modification:</b> 03.05.2015  |      |                                      |      |       |       |
| <b>Approved:</b>  |      |                                      |      |       |       |

## COURSE INFORMATION LETTER

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|--|-------|--|------|------|-------|
| <b>University:</b> P. J. Šafárik University in Košice  |       |  |      |      |       |
| <b>Faculty:</b> Faculty of Science   |       |  |      |      |       |
| <b>Course ID:</b> ÚINF/<br>TVY/15  |       | <b>Course name:</b> Computability theory |      |      |       |
| <b>Course type, scope and the method:</b><br><b>Course type:</b> Lecture / Practice<br><b>Recommended course-load (hours):</b><br><b>Per week:</b> 2 / 1 <b>Per study period:</b> 28 / 14<br><b>Course method:</b> present   |       |  |      |      |       |
| <b>Number of ECTS credits:</b> 4   |       |  |      |      |       |
| <b>Recommended semester/trimester of the course:</b> 5.  |       |  |      |      |       |
| <b>Course level:</b> I., II.   |       |  |      |      |       |
| <b>Prerequisites:</b>  |       |  |      |      |       |
| <b>Conditions for course completion:</b>   |       |  |      |      |       |
| <b>Learning outcomes:</b><br>To provide theoretical background for studying computer science in general, by familiarising students with basic knowledge of the theory of computability.  |       |  |      |      |       |
| <b>Brief outline of the course:</b><br>Turing machine as a formalisation of the notion of an algorithm. Partial recursive functions. Kleene's normal form theorem. The equivalences of the notion of a function calculable by a Turing machine, partial recursive and calculable by a computer program. Algorithmical undecidability of the halting problem of a Turing machine and a computer program.  |       |  |      |      |       |
| <b>Recommended literature:</b><br>1. BRIDGES, Douglas. Computability, A Mathematical Sketch book. Springer--Verlag, 1994. ISBN:: 978-0387941745<br>2. BUKOVSKÝ, Lev. Teória algoritmov, ES UPJŠ, Košice, 1999. ISBN 8070973730<br>3. MACHTEY, Michael a Paul YOUNG. An Introduction to the General Theory of Algorithms, North--Holland, Amsterdam 1978.<br>4. KRAJČI, Stanislav. Teória vypočítateľnosti. <a href="http://ics.upjs.sk/~krajci/skola/vyucba/ucebneTexty/vypocitatelnost.pdf">http://ics.upjs.sk/~krajci/skola/vyucba/ucebneTexty/vypocitatelnost.pdf</a> |       |  |      |      |       |
| <b>Course language:</b>  |       |  |      |      |       |
| <b>Notes:</b>  |       |  |      |      |       |
| <b>Course assessment</b><br>Total number of assessed students: 277   |       |  |      |      |       |
| A  | B     | C  | D    | E    | FX    |
| 46.93  | 11.91 | 13.0                                     | 5.78 | 6.14 | 16.25 |
| <b>Provides:</b> prof. RNDr. Stanislav Krajčí, PhD.  |       |  |      |      |       |
| <b>Date of last modification:</b> 08.07.2021   |       |  |      |      |       |
| <b>Approved:</b>   |       |  |      |      |       |

## COURSE INFORMATION LETTER

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|---|-------|--|-------|-------|-----|
| <b>University:</b> P. J. Šafárik University in Košice   |       |  |       |       |     |
| <b>Faculty:</b> Faculty of Science  |       |  |       |       |     |
| <b>Course ID:</b> ÚMV/<br>KOP/10  |       | <b>Course name:</b> Convex programming |       |       |     |
| <b>Course type, scope and the method:</b><br><b>Course type:</b> Lecture / Practice<br><b>Recommended course-load (hours):</b><br><b>Per week:</b> 3 / 1 <b>Per study period:</b> 42 / 14<br><b>Course method:</b> present  |       |  |       |       |     |
| <b>Number of ECTS credits:</b> 5  |       |  |       |       |     |
| <b>Recommended semester/trimester of the course:</b> 6.   |       |  |       |       |     |
| <b>Course level:</b> I.   |       |  |       |       |     |
| <b>Prerequisites:</b> ÚMV/LCO/10,(ÚMV/MAN1c/10 and leboÚMV/MAN2d/10 and leboÚMV/FRPb/19)  |       |  |       |       |     |
| <b>Conditions for course completion:</b><br>Based on the results of written tests (two per term, with emphasis on problem solving) and on the oral examination.   |       |  |       |       |     |
| <b>Learning outcomes:</b><br>To learn the theoretical basis and the most important methods of nonlinear programming   |       |  |       |       |     |
| <b>Brief outline of the course:</b><br>Practical problems leading to a nonlinear program. Convex sets and their properties. Convex functions – properties and criteria of convexity. Necessary and sufficient conditions of optimality. Karush-Kuhn-Tucker conditions. Quadratic programming. |       |  |       |       |     |
| <b>Recommended literature:</b><br>Bazaraa, Sherali, Shetty: Nonlinear programming, Wiley, New York 1993   |       |  |       |       |     |
| <b>Course language:</b><br>Slovak or English  |       |  |       |       |     |
| <b>Notes:</b>   |       |  |       |       |     |
| <b>Course assessment</b><br>Total number of assessed students: 79   |       |  |       |       |     |
| A   | B     | C                                      | D     | E     | FX  |
| 12.66   | 13.92 | 8.86                                   | 11.39 | 53.16 | 0.0 |
| <b>Provides:</b> prof. RNDr. Tomáš Madaras, PhD., Mgr. Alfréd Onderko   |       |  |       |       |     |
| <b>Date of last modification:</b> 03.05.2015  |       |  |       |       |     |
| <b>Approved:</b>  |       |  |       |       |     |

## COURSE INFORMATION LETTER

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|---|---|
| <b>University:</b> P. J. Šafárik University in Košice   |   |
| <b>Faculty:</b> Faculty of Science  |   |
| <b>Course ID:</b> ÚINF/<br>KRP1/15  | <b>Course name:</b> Cryptographic protocols |
| <b>Course type, scope and the method:</b><br><b>Course type:</b> Lecture / Practice<br><b>Recommended course-load (hours):</b><br><b>Per week:</b> 2 / 2 <b>Per study period:</b> 28 / 28<br><b>Course method:</b> present  |   |
| <b>Number of ECTS credits:</b> 4  |   |
| <b>Recommended semester/trimester of the course:</b> 5.   |   |
| <b>Course level:</b> I., II.  |   |
| <b>Prerequisites:</b>   |   |
| <b>Conditions for course completion:</b><br>Homeworks, active participation in laboratory exercises, presentation of a selected topic at a course seminar. Final written exam.  |   |
| <b>Learning outcomes:</b><br>Understand the problems of designing secure cryptographic protocols for authentication and key management. Know the ways to compromise them and be able to apply methods of proving their correctness. Control some automated verification tools. Understand and be able to apply advanced cryptographic techniques in various application fields - signature schemes, electronic banking, electronic voting. Orientation in current problems of implementation of cryptographic protocols.            |   |
| <b>Brief outline of the course:</b><br>Authentication and key establishment using shared and public key cryptography, key agreement protocols, conference key agreement, zero-knowledge protocols, provable security. Protocol architecture and formal definition, goals for authentication and key establishment, formal verification. Digital signature, implementation, trust distribution.<br>The final seminar with presentations on selected current topics - electronic banking, electronic voting, secure communication ... |   |
| <b>Recommended literature:</b><br>1. Colin Boyd, Anish Mathuria: Protocols for Authentication and Key Establishment, Springer, 2020<br>2. Douglas R. Stinson, Maura B. Paterson: Cryptography: Theory and Practice, Fourth Edition, Chapman & Hall/CRC, 2018<br>3. Paul C. van Oorschot: Computer Security and the Internet: Tools and Jewels, Springer, 2020<br>4. Peter Ryan, Steve Schneider: Modeling and Analysis of Security Protocols, Addison-Wesley, 2001  |   |
| <b>Course language:</b><br>Slovak or English  |   |
| <b>Notes:</b>   |   |

Content prerequisites: understanding of fundamental cryptographic concepts and primitives (as taught in the course KRS/15 or in the scope of the textbook "Understanding Cryptography" by Christof Paar and Jan Pelzl).  
The course is not organized annually.

**Course assessment**

Total number of assessed students: 21

| A    | B    | C     | D     | E     | FX   |
|------|------|-------|-------|-------|------|
| 38.1 | 4.76 | 19.05 | 19.05 | 14.29 | 4.76 |

**Provides:** doc. RNDr. Jozef Jirásek, PhD., RNDr. Rastislav Krivoš-Belluš, PhD.

**Date of last modification:** 07.07.2021

**Approved:**

## COURSE INFORMATION LETTER

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| <b>University:</b> P. J. Šafárik University in Košice  |                                   |
| <b>Faculty:</b> Faculty of Science   |                                   |
| <b>Course ID:</b> ÚMV/<br>ADA/19   | <b>Course name:</b> Data analysis |
| <b>Course type, scope and the method:</b><br><b>Course type:</b> Lecture / Practice<br><b>Recommended course-load (hours):</b><br><b>Per week:</b> 1 / 3 <b>Per study period:</b> 14 / 42<br><b>Course method:</b> present   |                                   |
| <b>Number of ECTS credits:</b> 4   |                                   |
| <b>Recommended semester/trimester of the course:</b> 4., 6.  |                                   |
| <b>Course level:</b> I., II.   |                                   |
| <b>Prerequisites:</b> ÚMV/UAD/10   |                                   |
| <b>Conditions for course completion:</b><br>Individual project work. Oral presentation of the individual project work.   |                                   |
| <b>Learning outcomes:</b><br>Students will gain practical skills in applying basic statistical methods of estimating and testing on real data using statistical software. At the same time, they will develop a concrete idea of the basic statistical concepts and methods discussed from a theoretical point of view in the following subjects.  |                                   |
| <b>Brief outline of the course:</b> <ol style="list-style-type: none"> <li>1. Data visualization using statistical software R.</li> <li>2. Basic principles of statistical inference. Random sample from normal distribution, q-q plot, testing of normality.</li> <li>3. Confidence intervals for proportions.</li> <li>4. Confidence intervals for means.</li> <li>5. Testing hypotheses about proportions and means.</li> <li>6. Relationships between quantitative variables. Linear regression, multiple regression.</li> <li>7. Goodness-of-Fit tests and contingency tables. Relationships between qualitative variables.</li> <li>8. Analysis of variance (principle, testing, graphical representation).</li> <li>9. Nonparametric methods of testing.</li> </ol> |                                   |
| <b>Recommended literature:</b> <ol style="list-style-type: none"> <li>1. Utts, J.M., Heckard, R.F. (2014): Mind od Statistics, 5th ed., Thomson Brooks/Cole</li> <li>2. CRAWLEY, M.J. (2005), Statistics: An Introdution using R, New York: Wiley</li> <li>3. WICKHAM, H. (2016), ggplot2: Elegant Graphics for Data Analysis, 2nd ed. Springer</li> <li>4. MOORE, D.S.(2000), The Active Practice of Statistics, New York: W. H. Freeman</li> <li>5. Anděl J. (2011): Základy matematické statistiky, MatfyzPress, Praha (in Czech.)</li> </ol>   |                                   |
| <b>Course language:</b>  |                                   |
| <b>Notes:</b>  |                                   |



|   |      |       |     |     |     |
|---|------|-------|-----|-----|-----|
| <b>Course assessment</b>  |      |       |     |     |     |
| Total number of assessed students: 15                                   |      |       |     |     |     |
| A   | B    | C     | D   | E   | FX  |
| 66.67   | 20.0 | 13.33 | 0.0 | 0.0 | 0.0 |
| <b>Provides:</b> RNDr. Martina Hančová, PhD., RNDr. Andrej Gajdoš, PhD. |      |       |     |     |     |
| <b>Date of last modification:</b> 18.03.2019                            |      |       |     |     |     |
| <b>Approved:</b>  |      |       |     |     |     |

## COURSE INFORMATION LETTER

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| <b>University:</b> P. J. Šafárik University in Košice   |  |
| <b>Faculty:</b> Faculty of Science  |  |
| <b>Course ID:</b> ÚMV/<br>DFR/10  | <b>Course name:</b> Differential equations |
| <b>Course type, scope and the method:</b><br><b>Course type:</b> Lecture / Practice<br><b>Recommended course-load (hours):</b><br><b>Per week:</b> 3 / 1 <b>Per study period:</b> 42 / 14<br><b>Course method:</b> present  |  |
| <b>Number of ECTS credits:</b> 5  |  |
| <b>Recommended semester/trimester of the course:</b> 5.   |  |
| <b>Course level:</b> I., II.  |  |
| <b>Prerequisites:</b>   |  |
| <b>Conditions for course completion:</b><br>Continuous assessment is taken the form of two tests during the semester. Final evaluation is given by continuous assessment (40%), written and oral part of the exam (30% and 30%).  |  |
| <b>Learning outcomes:</b><br>Theory of differential equations is one of the fundamental areas of mathematical analysis. It has numerous applications in various fields of science and technology. The main objective of this course is to familiarize students with the basics of the theory of ordinary differential equations and their systems, and methods for solving certain types of differential equations and systems. We consider them as possible mathematical models of real situations.  |  |
| <b>Brief outline of the course:</b><br>Basic concepts. Elementary methods for solving and applications of the first order differential equations. The existence and uniqueness of solutions to Cauchy problem for differential equations of the first order, the n-th order and for differential systems. The relationship between differential equations of the n-th order and systems. Linear differential equations of the n-th order and linear differential systems - the local and global theorem on the existence and uniqueness of solutions to Cauchy problem, basic properties of solutions, fundamental system of solutions, structure of general solution, Lagrange method of variation of constants, linear differential equations and systems with constant coefficients. Reduction of the order of differential equations. Euler differential equations. Elimination method for solving the systems of differential equations. |  |
| <b>Recommended literature:</b><br>1. L. Kluvánek, I. Mišík, M. Švec: Matematika II, SVTL, Bratislava, 1961 (in Slovak).<br>2. J. Eliaš, J. Horváth, J. Kajan: Zbierka úloh z vyššej matematiky 3, Alfa, Bratislava, 1980 (in Slovak).<br>3. S. J. Farlow: An introduction to differential equations and their applications, Dover Publications, New York, 2006.<br>4. W. Kohler, L. Johnson: Elementary differential equations with boundary value problems, Pearson Education, Boston, 2006.<br>5. M. Tenenbaum: Ordinary differential equations, Dover Publications, New York, 1985.<br>6. J. C. Robinson: An introduction to ordinary differential equations, Cambridge University Press, Cambridge, 2004.   |  |

7. J. Polking, A. Boggess, D. Arnold: Differential equations, Prentice Hall (Pearson), Upper Saddle River, 2006.

**Course language:**

Slovak

**Notes:**

**Course assessment**

Total number of assessed students: 149

| A     | B     | C     | D     | E     | FX   |
|-------|-------|-------|-------|-------|------|
| 20.13 | 20.81 | 14.77 | 22.15 | 18.79 | 3.36 |

**Provides:** Mgr. Jozef Kiseľák, PhD.

**Date of last modification:** 03.05.2015

**Approved:**

## COURSE INFORMATION LETTER

|  |       |  |       |       |      |
|--|-------|--|-------|-------|------|
| <b>University:</b> P. J. Šafárik University in Košice  |       |  |       |       |      |
| <b>Faculty:</b> Faculty of Science   |       |  |       |       |      |
| <b>Course ID:</b> ÚMV/<br>DSMa/10  |       | <b>Course name:</b> Discrete mathematics I |       |       |      |
| <b>Course type, scope and the method:</b><br><b>Course type:</b> Lecture / Practice<br><b>Recommended course-load (hours):</b><br><b>Per week:</b> 2 / 2 <b>Per study period:</b> 28 / 28<br><b>Course method:</b> present   |       |  |       |       |      |
| <b>Number of ECTS credits:</b> 5   |       |  |       |       |      |
| <b>Recommended semester/trimester of the course:</b> 3.  |       |  |       |       |      |
| <b>Course level:</b> I.  |       |  |       |       |      |
| <b>Prerequisites:</b>  |       |  |       |       |      |
| <b>Conditions for course completion:</b><br>Examination.   |       |  |       |       |      |
| <b>Learning outcomes:</b><br>To be familiar with some factual knowledge of combinatorics and graph theory. To understand and appreciate mathematical notions, definitions, and proofs, to solve problems requiring more than just standard recipes, and to express mathematical thoughts precisely and more rigorously.  |       |  |       |       |      |
| <b>Brief outline of the course:</b><br>Basic principles.<br>Counting and binomial coefficients, Binomial theorem, polynomial theorem.<br>Recurrence: Some miscellaneous problems, Fibonacci-type relations, Using generating functions, miscellaneous methods.<br>The inclusion-exclusion principle. Rook polynomials.<br>Introduction to graphs: The concept of graphs, paths in graphs. Connectivity. Trees, bipartite graphs. Planarity. Polyhedra.<br>Traveling round a graph: Eulerian graphs, Hamiltonian graphs.<br>Partitions and colourings: Vertex colourings of graphs. Edge colourings of graphs |       |  |       |       |      |
| <b>Recommended literature:</b><br>1. I. Anderson, A first course in discrete mathematics, Springer-Verlag London, 2001.<br>2. J. Matoušek and J. Nešetřil, Invitation to discrete mathematics, Oxford University Press Inc. , New York 1999.   |       |  |       |       |      |
| <b>Course language:</b><br>Slovak  |       |  |       |       |      |
| <b>Notes:</b>  |       |  |       |       |      |
| <b>Course assessment</b><br>Total number of assessed students: 300   |       |  |       |       |      |
| A  | B     | C  | D     | E     | FX   |
| 15.67  | 17.67 | 21.0                                       | 24.67 | 17.67 | 3.33 |

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| <b>Provides:</b> doc. RNDr. Roman Soták, PhD., RNDr. Mária Maceková, PhD. |
| <b>Date of last modification:</b> 20.09.2020                              |
| <b>Approved:</b>  |

## COURSE INFORMATION LETTER

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|---|---|
| <b>University:</b> P. J. Šafárik University in Košice   |   |
| <b>Faculty:</b> Faculty of Science  |   |
| <b>Course ID:</b> ÚMV/<br>DSMb/10   | <b>Course name:</b> Discrete mathematics II |
| <b>Course type, scope and the method:</b><br><b>Course type:</b> Lecture / Practice<br><b>Recommended course-load (hours):</b><br><b>Per week:</b> 2 / 2 <b>Per study period:</b> 28 / 28<br><b>Course method:</b> present  |   |
| <b>Number of ECTS credits:</b> 5  |   |
| <b>Recommended semester/trimester of the course:</b> 4.   |   |
| <b>Course level:</b> I.   |   |
| <b>Prerequisites:</b> ÚMV/DSMa/10 and leboÚMV/DSM3a/10  |   |
| <b>Conditions for course completion:</b><br>Two tests during the semester<br>It is made on the base of results of two tests during the semester (50%) and a final written exam and an oral exam (50%)   |   |
| <b>Learning outcomes:</b><br>Mastered fundamental methods of graph theory. To be familiar with some possibilities of applications of graph theory   |   |
| <b>Brief outline of the course:</b><br>Introduction to graphs.<br>Connectivity and distance in graphs.<br>Trees, spanning subgraphs<br>Independence and coverings.<br>Introduction to the Ramsey theory.<br>Introduction to the extremal graph theory.<br>Matchings: Theorem of Hall, theorem of Berge, optimal assignment problems.<br>Vertex colorings: Theorem of Brooks, Theorem of Erdos and Szekeres.<br>Chromatic polynomials.<br>Edge colourings, Theorem of Koenig.<br>Introduction to directed graphs: Basic notions, connectivities, tournaments, acyclic graphs, base and kernel of a graph.<br>Introduction to applications of graphs. |   |
| <b>Recommended literature:</b><br>1. A. Bondy and U.S.R. Murty: Graph theory, Springer-Verlag 2008<br>2. G. Chartrand, L. Lesniak, and P. Zhang, Graphs and digraphs, CRC Press, Boca Raton 2011<br>3. R. Diestel: Graph Theory, Springer-Verlag, New York, Inc. 1997<br>4. M.N.S. Swamy and K. Thulasiraman: Graphs, Networks and Algorithms. Willey Interscience Publ., New York 1981   |   |
| <b>Course language:</b><br>Slovak   |   |

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|--|-------|-------|------|-------|------|
| <b>Notes:</b>  |       |       |      |       |      |
| <b>Course assessment</b>   |       |       |      |       |      |
| Total number of assessed students: 179   |       |       |      |       |      |
| A  | B     | C     | D    | E     | FX   |
| 14.53  | 10.61 | 24.58 | 25.7 | 18.44 | 6.15 |
| <b>Provides:</b> RNDr. Igor Fabrici, Dr. rer. nat., RNDr. Mária Maceková, PhD. |       |       |      |       |      |
| <b>Date of last modification:</b> 03.05.2015                                   |       |       |      |       |      |
| <b>Approved:</b>   |       |       |      |       |      |

## COURSE INFORMATION LETTER

|   |  |
|---|--|
| <b>University:</b> P. J. Šafárik University in Košice   |  |
| <b>Faculty:</b> Faculty of Science  |  |
| <b>Course ID:</b> ÚMV/<br>DSMc/10   | <b>Course name:</b> Discrete mathematics III |
| <b>Course type, scope and the method:</b><br><b>Course type:</b> Lecture / Practice<br><b>Recommended course-load (hours):</b><br><b>Per week:</b> 2 / 2 <b>Per study period:</b> 28 / 28<br><b>Course method:</b> present  |  |
| <b>Number of ECTS credits:</b> 5  |  |
| <b>Recommended semester/trimester of the course:</b> 5.   |  |
| <b>Course level:</b> I.   |  |
| <b>Prerequisites:</b> ÚMV/DSMb/10   |  |
| <b>Conditions for course completion:</b><br>Two tests during the semester<br>It is made on the base of results of two tests during the semester (50%) and a final written exam and an oral exam (50%)   |  |
| <b>Learning outcomes:</b><br>Mastered fundamental methods of graph theory. Abilities of applications of graph theory.   |  |
| <b>Brief outline of the course:</b><br>Eulerian and Hamiltonian graphs.<br>Connectivity: Theorem of Menger.<br>Matching: Theorem of Tutte.<br>Planar graphs: Theorem of Kuratowski.<br>Plane graphs: Euler polyhedral formula and its consequences,<br>Introduction to the theory of light graphs in plane graphs.<br>Colourings of plane graphs.<br>Crossing numbers of graphs.<br>Introduction to the topological graph theory.<br>Edge colourings: Theorem of Vizing.<br>Application of Graph theory: The shortest path problem, the critical path method. |  |
| <b>Recommended literature:</b><br>1. A. Bondy and U.S.R. Murty: Graph theory, Springer-Verlag 2008<br>2. G. Chartrand, L. Lesniak, and P. Zhang, Graphs and digraphs, CRC Press, Boca Raton 2011<br>3. R. Diestel: Graph Theory, Springer-Verlag, New York, Inc. 1997<br>4. M.N.S. Swamy and K. Thulasiraman: Graphs, Networks and Algorithms.<br>Willey Interscience Publ., New York 1981  |  |
| <b>Course language:</b><br>Slovak   |  |
| <b>Notes:</b>   |  |



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|--|-------|-------|-------|-------|-----|
| <b>Course assessment</b>   |       |       |       |       |     |
| Total number of assessed students: 77  |       |       |       |       |     |
| A  | B     | C     | D     | E     | FX  |
| 15.58  | 31.17 | 15.58 | 24.68 | 12.99 | 0.0 |
| <b>Provides:</b> prof. RNDr. Tomáš Madaras, PhD., RNDr. Mária Maceková, PhD. |       |       |       |       |     |
| <b>Date of last modification:</b> 03.05.2015                                 |       |       |       |       |     |
| <b>Approved:</b>   |       |       |       |       |     |

## COURSE INFORMATION LETTER

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|--|-------|--|-------|------|-----|
| <b>University:</b> P. J. Šafárik University in Košice  |       |  |       |      |     |
| <b>Faculty:</b> Faculty of Science   |       |  |       |      |     |
| <b>Course ID:</b> ÚMV/BSE/14   |       | <b>Course name:</b> Economic and financial mathematics |       |      |     |
| <b>Course type, scope and the method:</b><br><b>Course type:</b><br><b>Recommended course-load (hours):</b><br><b>Per week: Per study period:</b><br><b>Course method:</b> present   |       |  |       |      |     |
| <b>Number of ECTS credits:</b> 4   |       |  |       |      |     |
| <b>Recommended semester/trimester of the course:</b>   |       |  |       |      |     |
| <b>Course level:</b> I.  |       |  |       |      |     |
| <b>Prerequisites:</b> ÚMV/MAN1d/10, ÚMV/TPP/19, ÚMV/MST/19   |       |  |       |      |     |
| <b>Conditions for course completion:</b><br>Acquiring the required number of credits in the structure defined by the study plan.   |       |  |       |      |     |
| <b>Learning outcomes:</b><br>Evaluation of student's competences with respect to the profile of the graduate.  |       |  |       |      |     |
| <b>Brief outline of the course:</b><br>The state examination is performed in a form of a debate with the emphasis on one topic of the following courses: ÚMV/MANd/10, ÚMV/TPP/19, ÚMV/MST/19, ÚMV/FIM/10, ÚMV/ZIP/10, ÚMV/LCO/10<br>1. Differential and integral calculus of several variables.<br>2. Measure theory and Lebesgue integral.<br>3. Random variables, their distributions and characteristics.<br>4. Estimation theory and testing statistical hypotheses.<br>5. Cash flows, their present and future value.<br>6. Analysis of securities and portfolio immunisation.<br>7. Mortality modelling and basic types of life insurance.<br>8. Methods of computing insurance premiums and insurance reserves.<br>9. Linear programming problems and solution methods.<br>10. Duality in linear programming and its economic interpretation. |       |  |       |      |     |
| <b>Recommended literature:</b>   |       |  |       |      |     |
| <b>Course language:</b><br>slovak  |       |  |       |      |     |
| <b>Notes:</b>  |       |  |       |      |     |
| <b>Course assessment</b><br>Total number of assessed students: 19  |       |  |       |      |     |
| A  | B     | C  | D     | E    | FX  |
| 31.58  | 15.79 | 31.58  | 15.79 | 5.26 | 0.0 |
| <b>Provides:</b>   |       |  |       |      |     |

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| <b>Date of last modification:</b> 07.04.2020 |
| <b>Approved:</b>                             |

## COURSE INFORMATION LETTER

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| <b>University:</b> P. J. Šafárik University in Košice  |   |
| <b>Faculty:</b> Faculty of Science   |   |
| <b>Course ID:</b> CJP/<br>PFAJ4/07   | <b>Course name:</b> English Language of Natural Science |
| <b>Course type, scope and the method:</b><br><b>Course type:</b> Practice<br><b>Recommended course-load (hours):</b><br><b>Per week:</b> 2 <b>Per study period:</b> 28<br><b>Course method:</b> present  |   |
| <b>Number of ECTS credits:</b> 2   |   |
| <b>Recommended semester/trimester of the course:</b> 2.  |   |
| <b>Course level:</b> I.  |   |
| <b>Prerequisites:</b>  |   |
| <b>Conditions for course completion:</b><br>Distant form of study (Online through MS teams) - based on the syllabus<br>Active participation in class and completed homework assignments. Students are allowed to miss 2 classes at the most (in case of online form - not attending online class/ assignments not handed in)<br>Continuous assessment: 2 credit tests taken thorough MS Teams online(presumably in weeks 6 and 13) and academic presentation in English given through MS Teams online.<br>In order to be admitted to the final exam, a student has to score at least 65 % as a sum of both credit tests.<br>The exam test results represent 50% of the final grade for the course, continuous assessment results represent the other 50% of the final grade.<br>The final grade for the course will be calculated as follows:<br>A 93-100, B 86-92, C 79-85, D 72-78, E 65-71, FX 64 and less. |   |
| <b>Learning outcomes:</b><br>Enhancement of students' language skills (speaking, writing, reading and listening comprehension) in English for specific purposes and development of students' language competence (familiarization with selected phonological, lexical and syntactic phenomena), improvement of students' pragmatic competence (familiarization with selected language functions) and improvement of presentation skills at B2 level (CEFR) with focus on terminology of English for natural science.   |   |
| <b>Brief outline of the course:</b> <ol style="list-style-type: none"> <li>1. Introduction to studying language</li> <li>2. Selected aspects of scientific language</li> <li>3. Talking about academic study</li> <li>4. Discussing science</li> <li>5. Defining scientific terminology and concepts</li> <li>6. Expressing cause and effect</li> <li>7. Describing structures</li> <li>8. Explaining processes</li> <li>9. Comparing objects, structures and concepts</li> <li>10. Talking about problem and solution</li> <li>11. Referencing authors</li> </ol>   |   |

|   |      |       |      |      |      |
|---|------|-------|------|------|------|
| 12. Giving examples<br>13. Visual aids and numbers<br>14. Referencing time and place<br>Presentation topics related to students' study fields.  |      |       |      |      |      |
| <b>Recommended literature:</b><br>study materials provided by the course instructor<br>Redman, S.: English Vocabulary in Use, Pre-intermediate, Intermediate. Cambridge University Press, 2003.<br>Armer, T.: Cambridge English for Scientists. CUP, 2011.<br>Wharton J.: Academic Encounters. The Natural World. CUP, 2009.<br>Murphy, R.: English Grammar in Use. Cambridge University Press, 1994.<br>P. Fitzgerald : English for ICT studies. Garnet Publishing, 2011.<br><a href="https://worldservice/learningenglish">https://worldservice/learningenglish</a> , <a href="https://spectator.sme.sk">https://spectator.sme.sk</a><br><a href="http://www.isllibrary.com">www.isllibrary.com</a> |      |       |      |      |      |
| <b>Course language:</b>   |      |       |      |      |      |
| <b>Notes:</b>   |      |       |      |      |      |
| <b>Course assessment</b><br>Total number of assessed students: 2744   |      |       |      |      |      |
| A   | B    | C     | D    | E    | FX   |
| 38.16   | 25.4 | 16.65 | 9.73 | 7.87 | 2.19 |
| <b>Provides:</b> Mgr. Lenka Klimčáková, Mgr. Viktória Mária Slovenská, Mgr. Zuzana Nad'ová  |      |       |      |      |      |
| <b>Date of last modification:</b> 14.02.2021  |      |       |      |      |      |
| <b>Approved:</b>  |      |       |      |      |      |

## COURSE INFORMATION LETTER

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|--|-------|---|-------|-------|------|
| <b>University:</b> P. J. Šafárik University in Košice  |       |   |       |       |      |
| <b>Faculty:</b> Faculty of Science   |       |   |       |       |      |
| <b>Course ID:</b> ÚMV/<br>FMT/10   |       | <b>Course name:</b> Financial mathematics |       |       |      |
| <b>Course type, scope and the method:</b><br><b>Course type:</b> Lecture / Practice<br><b>Recommended course-load (hours):</b><br><b>Per week:</b> 2 / 1 <b>Per study period:</b> 28 / 14<br><b>Course method:</b> present   |       |   |       |       |      |
| <b>Number of ECTS credits:</b> 4   |       |   |       |       |      |
| <b>Recommended semester/trimester of the course:</b> 3.  |       |   |       |       |      |
| <b>Course level:</b> I.  |       |   |       |       |      |
| <b>Prerequisites:</b>  |       |   |       |       |      |
| <b>Conditions for course completion:</b><br>Two tests during the semester<br>Based on written tests and oral exam.   |       |   |       |       |      |
| <b>Learning outcomes:</b><br>Knowledge of the basics of financial mathematics.   |       |   |       |       |      |
| <b>Brief outline of the course:</b><br>Financial systems and their structure. Simple, compound and continuous interesting and discounting. The time value of money, inflation and taxes. Cash flows, their present and future value. Annuities, savings and loan amortizations. The time structure of interest rates, yield curves. Analysis of investments, decisional criteria and techniques of valuation and comparison of financial projects. Stocks and bonds, their valuation, duration and konvexity. Immunization of portfolio. Financial derivatives, business strategies. |       |   |       |       |      |
| <b>Recommended literature:</b><br>1. Skřivánková V.-Skřivánek J.: Kvantitativne metódy finančných operácií, IURA Edition, Bratislava, 2006.<br>2. Capiński M., Zastawniak T.: Mathematics for Finance, Springer, London, 2011.<br>3. Lovelock at al.: An Introduction to the Mathematics of Money, Springer, London, 2007.<br>4. Janssen at al.: Mathematical Finance, ISTE / Wiley, 2009  |       |   |       |       |      |
| <b>Course language:</b><br>Slovak  |       |   |       |       |      |
| <b>Notes:</b>  |       |   |       |       |      |
| <b>Course assessment</b><br>Total number of assessed students: 55  |       |   |       |       |      |
| A  | B     | C   | D     | E     | FX   |
| 7.27   | 12.73 | 25.45                                     | 21.82 | 23.64 | 9.09 |
| <b>Provides:</b> Mgr. Katarína Lučivjanská, PhD.   |       |   |       |       |      |
| <b>Date of last modification:</b> 22.09.2015   |       |   |       |       |      |

**Approved:**

## COURSE INFORMATION LETTER

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|--|------|---|-------|-------|------|
| <b>University:</b> P. J. Šafárik University in Košice  |      |   |       |       |      |
| <b>Faculty:</b> Faculty of Science   |      |   |       |       |      |
| <b>Course ID:</b> ÚMV/<br>FRPa/19  |      | <b>Course name:</b> Function of real variable |       |       |      |
| <b>Course type, scope and the method:</b><br><b>Course type:</b> Lecture / Practice<br><b>Recommended course-load (hours):</b><br><b>Per week:</b> 2 / 4 <b>Per study period:</b> 28 / 56<br><b>Course method:</b> present   |      |   |       |       |      |
| <b>Number of ECTS credits:</b> 7   |      |   |       |       |      |
| <b>Recommended semester/trimester of the course:</b> 1.  |      |   |       |       |      |
| <b>Course level:</b> I.  |      |   |       |       |      |
| <b>Prerequisites:</b>  |      |   |       |       |      |
| <b>Conditions for course completion:</b><br>Written exam.  |      |   |       |       |      |
| <b>Learning outcomes:</b><br>The course provides an introductory knowledge on basic tools of differential and integral calculus of real functions of one real variable, and a development of certain calculation skills in the field.  |      |   |       |       |      |
| <b>Brief outline of the course:</b><br>1. Basics of mathematical logic and notations.<br>2. Real functions - basic notions, operation, graphs, continuity.<br>3. Differential calculus of functions of one real variable - differentiability, using the derivative.<br>4. Integral calculus of functions of one real variable - Newton integral. |      |   |       |       |      |
| <b>Recommended literature:</b><br>1. Brannan, D.: A First Course in Mathematical Analysis, Cambridge University Press, Cambridge 2006.<br>2. Bruckner, A. M., Bruckner J. B., Thomson, B. S.: Real Analysis, Second Edition, ClassicalRealAnalysis.com, 2008.<br>3. Zorich, V. A.: Mathematical Analysis I, Springer-Verlag 2002.                |      |   |       |       |      |
| <b>Course language:</b>  |      |   |       |       |      |
| <b>Notes:</b>  |      |   |       |       |      |
| <b>Course assessment</b><br>Total number of assessed students: 621   |      |   |       |       |      |
| A  | B    | C   | D     | E     | FX   |
| 7.89   | 9.02 | 15.46   | 22.38 | 35.59 | 9.66 |
| <b>Provides:</b> doc. RNDr. Ondrej Hutník, PhD., RNDr. Lenka Halčinová, PhD., RNDr. Jana Borzová, PhD.   |      |   |       |       |      |
| <b>Date of last modification:</b> 26.03.2019   |      |   |       |       |      |
| <b>Approved:</b>   |      |   |       |       |      |



## COURSE INFORMATION LETTER

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|---|-------|--------------------------------|-------|-------|-----|
| <b>University:</b> P. J. Šafárik University in Košice   |       |                                |       |       |     |
| <b>Faculty:</b> Faculty of Science  |       |                                |       |       |     |
| <b>Course ID:</b> ÚMV/<br>GEO1a/10  |       | <b>Course name:</b> Geometry I |       |       |     |
| <b>Course type, scope and the method:</b><br><b>Course type:</b> Lecture / Practice<br><b>Recommended course-load (hours):</b><br><b>Per week:</b> 4 / 2 <b>Per study period:</b> 56 / 28<br><b>Course method:</b> present  |       |                                |       |       |     |
| <b>Number of ECTS credits:</b> 7  |       |                                |       |       |     |
| <b>Recommended semester/trimester of the course:</b> 5.   |       |                                |       |       |     |
| <b>Course level:</b> I.   |       |                                |       |       |     |
| <b>Prerequisites:</b> ÚMV/ALG1b/10  |       |                                |       |       |     |
| <b>Conditions for course completion:</b><br>Test<br>Exam  |       |                                |       |       |     |
| <b>Learning outcomes:</b><br>To obtain a deeper knowledge on Euclidean spaces and basic geometric transformations.  |       |                                |       |       |     |
| <b>Brief outline of the course:</b><br>Euclidean spaces, the distance and angle of subspaces. The measure of angle and the volume of convex polyhedron. Geometry of the triangle. Curves and surfaces of second order. Affine transformations. Isometric transformations and similitudes. |       |                                |       |       |     |
| <b>Recommended literature:</b><br>A. F. Beardon: Algebra and geometry, Cambridge University Press, 2005   |       |                                |       |       |     |
| <b>Course language:</b><br>Slovak   |       |                                |       |       |     |
| <b>Notes:</b>   |       |                                |       |       |     |
| <b>Course assessment</b><br>Total number of assessed students: 99   |       |                                |       |       |     |
| A   | B     | C                              | D     | E     | FX  |
| 10.1  | 15.15 | 10.1                           | 23.23 | 41.41 | 0.0 |
| <b>Provides:</b> RNDr. Lucia Janičková, PhD., RNDr. Mária Šurimová, PhD.  |       |                                |       |       |     |
| <b>Date of last modification:</b> 03.05.2015  |       |                                |       |       |     |
| <b>Approved:</b>  |       |                                |       |       |     |

## COURSE INFORMATION LETTER

|  |   |
|--|---|
| <b>University:</b> P. J. Šafárik University in Košice  |   |
| <b>Faculty:</b> Faculty of Science   |   |
| <b>Course ID:</b> Dek. PF<br>UPJŠ/USPV/13  | <b>Course name:</b> Introduction to Study of Sciences |
| <b>Course type, scope and the method:</b><br><b>Course type:</b> Lecture / Practice<br><b>Recommended course-load (hours):</b><br><b>Per week: Per study period:</b> 12s / 3d<br><b>Course method:</b> present |   |
| <b>Number of ECTS credits:</b> 2   |   |
| <b>Recommended semester/trimester of the course:</b> 1.  |   |
| <b>Course level:</b> I.  |   |
| <b>Prerequisites:</b>  |   |
| <b>Conditions for course completion:</b>   |   |
| <b>Learning outcomes:</b>  |   |
| <b>Brief outline of the course:</b>  |   |
| <b>Recommended literature:</b>   |   |
| <b>Course language:</b>  |   |
| <b>Notes:</b>  |   |
| <b>Course assessment</b><br>Total number of assessed students: 1734  |   |
| abs  | n   |
| 86.51  | 13.49   |
| <b>Provides:</b> doc. RNDr. Marián Kireš, PhD.   |   |
| <b>Date of last modification:</b> 25.09.2019   |   |
| <b>Approved:</b>   |   |

## COURSE INFORMATION LETTER

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|---|---|
| <b>University:</b> P. J. Šafárik University in Košice   |   |
| <b>Faculty:</b> Faculty of Science  |   |
| <b>Course ID:</b> ÚMV/<br>UAD/10  | <b>Course name:</b> Introduction to data analysis |
| <b>Course type, scope and the method:</b><br><b>Course type:</b> Lecture / Practice<br><b>Recommended course-load (hours):</b><br><b>Per week:</b> 1 / 1 <b>Per study period:</b> 14 / 14<br><b>Course method:</b> present  |   |
| <b>Number of ECTS credits:</b> 2  |   |
| <b>Recommended semester/trimester of the course:</b> 3.   |   |
| <b>Course level:</b> I.   |   |
| <b>Prerequisites:</b>   |   |
| <b>Conditions for course completion:</b><br>Test and individual project work.<br>Oral presentation of the individual project work.  |   |
| <b>Learning outcomes:</b><br>To know the basic purpose of statistical data analysis, its methods and statistical thinking and understand its importance for science and practical life.<br>To understand elementary statistical concepts.<br>To gain experience in handling real data using spreadsheet Excel and statistical software R.   |   |
| <b>Brief outline of the course:</b><br>1. Introduction (the basic philosophy and aim of statistical data analysis, descriptive and inductive statistics)<br>2. Collecting Data (types of data, random sample, randomized experiment)<br>3. Handling Data (visualization, summarizing – measures of center, measures of variability, skewness and kurtosis, relationships in data – introduction to regression and correlation)<br>4. Statistical inference (elementary view into estimation and testing hypothesis) |   |
| <b>Recommended literature:</b><br>1. Anděl, J.: Statistické metody, Matfyzpress, Praha, 1998 (in Czech)<br>2. Rossman, A.J. et al.: Workshop Statistics: Discovery with Data and Fathom, 3rd ed. Wiley, 2009<br>3. Utts, J.M.: Seeing Through Statistics, 4th ed., Thomson Brooks/Cole, Belmont, 2014<br>4. Utts, J.M., Heckard R.F.: Mind on Statistics, 5th ed. Thomson Brooks/Cole, Belmont, 2014<br>5. Zvára, K., Štěpán, J.: Pravděpodobnost a matematická statistika, Matfyzpress, Praha, 2001 (in Czech)     |   |
| <b>Course language:</b><br>Slovak   |   |
| <b>Notes:</b>   |   |

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|--|------|-------|-------|------|-----|
| <b>Course assessment</b>                     |      |       |       |      |     |
| Total number of assessed students: 328       |      |       |       |      |     |
| A  | B    | C     | D     | E    | FX  |
| 33.54  | 25.3 | 28.96 | 11.28 | 0.61 | 0.3 |
| <b>Provides:</b> RNDr. Martina Hančová, PhD. |      |       |       |      |     |
| <b>Date of last modification:</b> 18.09.2020 |      |       |       |      |     |
| <b>Approved:</b>                             |      |       |       |      |     |

## COURSE INFORMATION LETTER

|   |   |
|---|---|
| <b>University:</b> P. J. Šafárik University in Košice   |   |
| <b>Faculty:</b> Faculty of Science  |   |
| <b>Course ID:</b> ÚMV/<br>UDM/10  | <b>Course name:</b> Introduction to mathematics |
| <b>Course type, scope and the method:</b><br><b>Course type:</b> Lecture / Practice<br><b>Recommended course-load (hours):</b><br><b>Per week:</b> 1 / 2 <b>Per study period:</b> 14 / 28<br><b>Course method:</b> present  |   |
| <b>Number of ECTS credits:</b> 3  |   |
| <b>Recommended semester/trimester of the course:</b> 1.   |   |
| <b>Course level:</b> I.   |   |
| <b>Prerequisites:</b>   |   |
| <b>Conditions for course completion:</b><br>Two tests during the semester.  |   |
| <b>Learning outcomes:</b><br>Repetition of problematic sections of the secondary mathematics by interesting tasks.  |   |
| <b>Brief outline of the course:</b><br>Simplification of algebraic expressions. Real number, absolute value of real numbers; equations and inequalities. Irrational equations and inequalities. Concept of function. Linear and quadratic function; equations and inequalities. Exponential and logarithmic function; equations and inequalities. Goniometric functions; equations and inequalities. Complex numbers.   |   |
| <b>Recommended literature:</b><br>1. V. Medek - L. Mišík - T. Šalát: REPETITÓRIUM STREDOŠKOLSKEJ MATEMATIKY, Alfa Bratislava, 1976<br>2. S. Richtárová - D. Kyselová: MATEMATIKA (pomôcka pre maturantov a uchádzačov o štúdium na vysokých školách), Enigma Nitra, 1998<br>3. O. Hudec – Z. Kimáková – E. Švidroňová: PRÍKLADY Z MATEMATIKY (pre uchádzačov o štúdium na TU v Košiciach), EF TU Košice, 1999<br>4. F. Peller – V. Šáner – J. Eliáš – Ľ. Pinda: MATEMATIKA – Podklady na prijímacie testy pre uchádzačov o štúdium, Ekonóm Bratislava, 2000/2001<br>5. F. Vesajda – F. Talafous: ZBIERKA ÚLOH Z MATEMATIKY pre stredné všeobecnovzdelávacie školy a gymnáziá, SPN Bratislava, 1973<br>6. J. Lukášová – O. Odvárko – B. Riečan – J. Šedivý – J. Vyšín: ÚLOHY Z MATEMATIKY pre 4. ročník gymnáziá, SPN Bratislava, 1976 |   |
| <b>Course language:</b><br>Slovak   |   |
| <b>Notes:</b>   |   |

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|---|-------|-------|-------|-------|-------|
| <b>Course assessment</b>  |       |       |       |       |       |
| Total number of assessed students: 471  |       |       |       |       |       |
| A   | B     | C     | D     | E     | FX    |
| 22.51   | 19.75 | 17.41 | 16.99 | 11.68 | 11.68 |
| <b>Provides:</b> doc. RNDr. Matúš Harminc, CSc., RNDr. Zuzana Gönciová, Mgr. Monika Krišáková |       |       |       |       |       |
| <b>Date of last modification:</b> 03.05.2015  |       |       |       |       |       |
| <b>Approved:</b>  |       |       |       |       |       |

## COURSE INFORMATION LETTER

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|---|------------------------------------|
| <b>University:</b> P. J. Šafárik University in Košice   |                                    |
| <b>Faculty:</b> Faculty of Science  |                                    |
| <b>Course ID:</b> ÚMV/<br>ZIP/10  | <b>Course name:</b> Life insurance |
| <b>Course type, scope and the method:</b><br><b>Course type:</b> Lecture / Practice<br><b>Recommended course-load (hours):</b><br><b>Per week:</b> 2 / 1 <b>Per study period:</b> 28 / 14<br><b>Course method:</b> present  |                                    |
| <b>Number of ECTS credits:</b> 4  |                                    |
| <b>Recommended semester/trimester of the course:</b> 6.   |                                    |
| <b>Course level:</b> I.   |                                    |
| <b>Prerequisites:</b> ÚMV/MANb/19, ÚMV/TPP/19   |                                    |
| <b>Conditions for course completion:</b><br>Given at the basis of partial examination, written part, and oral part of the exam.   |                                    |
| <b>Learning outcomes:</b><br>Mastering basics of insurance mathematics for life insurance.  |                                    |
| <b>Brief outline of the course:</b> <ul style="list-style-type: none"> <li>• Interest calculus in insurance (compound and continuous interests, annuities and perpetuities)</li> <li>• Mortality modeling               <ul style="list-style-type: none"> <li>o Lifetime, force of mortality, distribution of future lifetime</li> <li>o Curtate and fractional future lifetime</li> <li>o Multiple decrement model</li> <li>o Life tables</li> <li>o Estimation of probabilities of death</li> </ul> </li> <li>• Elementary types of life insurance               <ul style="list-style-type: none"> <li>o Equivalence principle</li> <li>o Life insurance with fixed and varying benefits</li> <li>o Elementary types of life annuities, variable life annuities</li> </ul> </li> <li>• Calculation of premiums               <ul style="list-style-type: none"> <li>o Net premiums</li> <li>o Expense-loaded premiums</li> <li>o Health risks in insurance</li> <li>o Multiple lives insurance</li> </ul> </li> <li>• Premium reserves               <ul style="list-style-type: none"> <li>o Net premium reserves</li> <li>o Expense-loaded premium reserves</li> </ul> </li> <li>• Reinsurance in life insurance</li> </ul> |                                    |
| <b>Recommended literature:</b> <ul style="list-style-type: none"> <li>• Gerber: Life insurance mathematics, Springer, 1997</li> <li>• Bowers et al.: Actuarial mathematics, The Society of Actuaries, 1986</li> </ul>   |                                    |
| <b>Course language:</b>   |                                    |

|  |       |       |       |      |       |
|--|-------|-------|-------|------|-------|
| Slovak   |       |       |       |      |       |
| <b>Notes:</b>  |       |       |       |      |       |
| <b>Course assessment</b>   |       |       |       |      |       |
| Total number of assessed students: 68                                    |       |       |       |      |       |
| A  | B     | C     | D     | E    | FX    |
| 13.24  | 20.59 | 16.18 | 13.24 | 25.0 | 11.76 |
| <b>Provides:</b> prof. RNDr. Ivan Žežula, CSc., RNDr. Daniel Klein, PhD. |       |       |       |      |       |
| <b>Date of last modification:</b> 03.05.2015                             |       |       |       |      |       |
| <b>Approved:</b>   |       |       |       |      |       |



## COURSE INFORMATION LETTER

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| <b>University:</b> P. J. Šafárik University in Košice  |       |  |       |       |     |
| <b>Faculty:</b> Faculty of Science   |       |  |       |       |     |
| <b>Course ID:</b> ÚMV/<br>LCO/10   |       | <b>Course name:</b> Linear and integer programming |       |       |     |
| <b>Course type, scope and the method:</b><br><b>Course type:</b> Lecture / Practice<br><b>Recommended course-load (hours):</b><br><b>Per week:</b> 2 / 2 <b>Per study period:</b> 28 / 28<br><b>Course method:</b> present   |       |  |       |       |     |
| <b>Number of ECTS credits:</b> 5   |       |  |       |       |     |
| <b>Recommended semester/trimester of the course:</b> 5.  |       |  |       |       |     |
| <b>Course level:</b> I.  |       |  |       |       |     |
| <b>Prerequisites:</b> ÚMV/ALGa/10  |       |  |       |       |     |
| <b>Conditions for course completion:</b><br>Two tests, using software CASSIM, oral exam  |       |  |       |       |     |
| <b>Learning outcomes:</b><br>To learn the solving methods of linear programming  |       |  |       |       |     |
| <b>Brief outline of the course:</b><br>Formulation of linear and integer programs. Graphic solution. Simplex method, its variants and finiteness. Duality and its economic interpretation. Sensitivity analysis and parametric programming. Algorithms for integer programming.  |       |  |       |       |     |
| <b>Recommended literature:</b><br>Ch. Papadimitriou – K. Steiglitz: Combinatorial Optimization: Algorithms and Complexity, 1984<br>R.J. Vanderbei, Linear Programming: Foundations and Extensions (Kluwer 2001), electronic version: <a href="http://www.princeton.edu/~rvdb/LPbook/">http://www.princeton.edu/~rvdb/LPbook/</a> |       |  |       |       |     |
| <b>Course language:</b><br>Slovak  |       |  |       |       |     |
| <b>Notes:</b>  |       |  |       |       |     |
| <b>Course assessment</b><br>Total number of assessed students: 128   |       |  |       |       |     |
| A  | B     | C  | D     | E     | FX  |
| 21.88  | 16.41 | 20.31  | 22.66 | 18.75 | 0.0 |
| <b>Provides:</b> prof. RNDr. Katarína Cechlárová, DrSc., RNDr. Andrej Gajdoš, PhD.   |       |  |       |       |     |
| <b>Date of last modification:</b> 03.05.2015   |       |  |       |       |     |
| <b>Approved:</b>   |       |  |       |       |     |

## COURSE INFORMATION LETTER

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|--|-------|--|-------|-------|------|
| <b>University:</b> P. J. Šafárik University in Košice  |       |  |       |       |      |
| <b>Faculty:</b> Faculty of Science   |       |  |       |       |      |
| <b>Course ID:</b> ÚMV/<br>LTM/10   |       | <b>Course name:</b> Logic and set theory |       |       |      |
| <b>Course type, scope and the method:</b><br><b>Course type:</b> Lecture / Practice<br><b>Recommended course-load (hours):</b><br><b>Per week:</b> 3 / 2 <b>Per study period:</b> 42 / 28<br><b>Course method:</b> present   |       |  |       |       |      |
| <b>Number of ECTS credits:</b> 6   |       |  |       |       |      |
| <b>Recommended semester/trimester of the course:</b> 5.  |       |  |       |       |      |
| <b>Course level:</b> I., II.   |       |  |       |       |      |
| <b>Prerequisites:</b> ÚMV/MANb/19 and leboÚMV/FRPb/19  |       |  |       |       |      |
| <b>Conditions for course completion:</b><br>Exam   |       |  |       |       |      |
| <b>Learning outcomes:</b><br>To obtain a basic knowledge on the mathematical notion of an infinity. Analysis of the notion of a proof.   |       |  |       |       |      |
| <b>Brief outline of the course:</b><br>Set as a mathematical formularization of an infinity. Properties of the set of reals. Mathematical induction. Relations and mappings.<br>Finite and countable sets. Cardinality of continuum. Elementary cardinal arithmetics.<br>Sentential calculus, an axiomatization. Completeness Theorem. Methods of proofs. Language of predicate calculus, examples. Axiomatizations of predicate calculus and the notion of a proof.<br>Methods of proofs in predicate calculus. |       |  |       |       |      |
| <b>Recommended literature:</b><br>E. Mendelson, Introduction to Mathematical Logic, van Nostrand 1964.   |       |  |       |       |      |
| <b>Course language:</b><br>Slovak  |       |  |       |       |      |
| <b>Notes:</b>  |       |  |       |       |      |
| <b>Course assessment</b><br>Total number of assessed students: 226   |       |  |       |       |      |
| A  | B     | C  | D     | E     | FX   |
| 10.62  | 18.14 | 20.35                                    | 15.93 | 32.74 | 2.21 |
| <b>Provides:</b> doc. RNDr. Jaroslav Ivančo, CSc., Mgr. Adam Marton  |       |  |       |       |      |
| <b>Date of last modification:</b> 03.05.2015   |       |  |       |       |      |
| <b>Approved:</b>   |       |  |       |       |      |

## COURSE INFORMATION LETTER

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|---|-------|------------------------------------|-------|------|------|
| <b>University:</b> P. J. Šafárik University in Košice   |       |                                    |       |      |      |
| <b>Faculty:</b> Faculty of Science  |       |                                    |       |      |      |
| <b>Course ID:</b> ÚMV/<br>MAE/10  |       | <b>Course name:</b> Macroeconomics |       |      |      |
| <b>Course type, scope and the method:</b><br><b>Course type:</b> Lecture / Practice<br><b>Recommended course-load (hours):</b><br><b>Per week:</b> 2 / 1 <b>Per study period:</b> 28 / 14<br><b>Course method:</b> present  |       |                                    |       |      |      |
| <b>Number of ECTS credits:</b> 4  |       |                                    |       |      |      |
| <b>Recommended semester/trimester of the course:</b> 1., 3.   |       |                                    |       |      |      |
| <b>Course level:</b> I.   |       |                                    |       |      |      |
| <b>Prerequisites:</b>   |       |                                    |       |      |      |
| <b>Conditions for course completion:</b><br>Final mark is given based on the results of the tests written during the semester and oral exam, that evaluates the verbal argument about the studied models.   |       |                                    |       |      |      |
| <b>Learning outcomes:</b>   |       |                                    |       |      |      |
| <b>Brief outline of the course:</b><br>Basic macroeconomic notions: Gross domestic product, inflation, unemployment.. Analysis of goods markets. Financial markets. IS-LM model in closed economy. Open economy. IS-LM model in open economy. Models of labour market. Inflation and economic growth. High depth. |       |                                    |       |      |      |
| <b>Recommended literature:</b><br>1. Olivier Blanchard, Alessia Amighini, Francesco Giavazzi: MACROECONOMICS, A EUROPEAN PERSPECTIVE, Pearson Education, 2010<br>2. N.GREGORY MANKIW, MACROECONOMICS, 7th Edition, Harvard University, Worth Publishers 2009  |       |                                    |       |      |      |
| <b>Course language:</b><br>Slovak and English   |       |                                    |       |      |      |
| <b>Notes:</b>   |       |                                    |       |      |      |
| <b>Course assessment</b><br>Total number of assessed students: 80   |       |                                    |       |      |      |
| A   | B     | C                                  | D     | E    | FX   |
| 25.0  | 13.75 | 21.25                              | 21.25 | 12.5 | 6.25 |
| <b>Provides:</b> prof. RNDr. Katarína Cechlárová, DrSc.   |       |                                    |       |      |      |
| <b>Date of last modification:</b> 31.01.2019  |       |                                    |       |      |      |
| <b>Approved:</b>  |       |                                    |       |      |      |

## COURSE INFORMATION LETTER

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|---|-------------------------------------|
| <b>University:</b> P. J. Šafárik University in Košice   |                                     |
| <b>Faculty:</b> Faculty of Science  |                                     |
| <b>Course ID:</b> ÚMV/<br>PMA/18  | <b>Course name:</b> Math proseminar |
| <b>Course type, scope and the method:</b><br><b>Course type:</b> Practice<br><b>Recommended course-load (hours):</b><br><b>Per week:</b> 2 <b>Per study period:</b> 28<br><b>Course method:</b> present |                                     |
| <b>Number of ECTS credits:</b> 0  |                                     |
| <b>Recommended semester/trimester of the course:</b> 1.   |                                     |
| <b>Course level:</b> I.   |                                     |
| <b>Prerequisites:</b>   |                                     |
| <b>Conditions for course completion:</b>  |                                     |
| <b>Learning outcomes:</b>   |                                     |
| <b>Brief outline of the course:</b>   |                                     |
| <b>Recommended literature:</b>  |                                     |
| <b>Course language:</b>   |                                     |
| <b>Notes:</b>   |                                     |
| <b>Course assessment</b><br>Total number of assessed students: 0  |                                     |
| abs   | n                                   |
| 0.0   | 0.0                                 |
| <b>Provides:</b> RNDr. Igor Fabrici, Dr. rer. nat., RNDr. Lenka Halčinová, PhD.   |                                     |
| <b>Date of last modification:</b>   |                                     |
| <b>Approved:</b>  |                                     |

## COURSE INFORMATION LETTER

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|--|------|---|-------|-------|------|
| <b>University:</b> P. J. Šafárik University in Košice  |      |   |       |       |      |
| <b>Faculty:</b> Faculty of Science   |      |   |       |       |      |
| <b>Course ID:</b> ÚMV/<br>MAN1c/10   |      | <b>Course name:</b> Mathematical analysis III |       |       |      |
| <b>Course type, scope and the method:</b><br><b>Course type:</b> Lecture / Practice<br><b>Recommended course-load (hours):</b><br><b>Per week:</b> 4 / 2 <b>Per study period:</b> 56 / 28<br><b>Course method:</b> present   |      |   |       |       |      |
| <b>Number of ECTS credits:</b> 7   |      |   |       |       |      |
| <b>Recommended semester/trimester of the course:</b> 3.  |      |   |       |       |      |
| <b>Course level:</b> I.  |      |   |       |       |      |
| <b>Prerequisites:</b> ÚMV/MANb/19  |      |   |       |       |      |
| <b>Conditions for course completion:</b><br>exam   |      |   |       |       |      |
| <b>Learning outcomes:</b><br>Understanding of the basic rigorous ideas of Mathematical Analysis.   |      |   |       |       |      |
| <b>Brief outline of the course:</b><br>Riemann integral. Functional series. Pointwise and uniform convergence. Power series. Fourier series. Euclidean spaces. Limits and continuity of real functions of several variables. Partial derivatives. Implicit function. Inverse mapping. Local, global and constrained extrema.   |      |   |       |       |      |
| <b>Recommended literature:</b><br>B. S. Thomson, J. B. Bruckner, A. M. Bruckner: Elementary Real Analysis, Prentice Hall, 2001.<br>J. Doboš, M. Zásalická: Zbierka úloh z matematiky III, Elfa, Košice, 2002.<br>Л. Д. Кудрявцев, А. Д. Кутасов, В. И. Чехлов, М. И. Шабунин: Сборник задач по математическому анализу, Наука, Москва, 1995.<br>Qian, Z., Analysis III: Integration, Mathematical Institute, Oxford, 2011. |      |   |       |       |      |
| <b>Course language:</b><br>Slovak  |      |   |       |       |      |
| <b>Notes:</b>  |      |   |       |       |      |
| <b>Course assessment</b><br>Total number of assessed students: 110   |      |   |       |       |      |
| A  | B    | C   | D     | E     | FX   |
| 2.73   | 3.64 | 9.09  | 20.91 | 55.45 | 8.18 |
| <b>Provides:</b> prof. RNDr. Jozef Doboš, CSc., RNDr. Lenka Halčinová, PhD.  |      |   |       |       |      |
| <b>Date of last modification:</b> 03.05.2015   |      |   |       |       |      |
| <b>Approved:</b>   |      |   |       |       |      |

## COURSE INFORMATION LETTER

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|--|------|--|-------|-------|------|
| <b>University:</b> P. J. Šafárik University in Košice  |      |  |       |       |      |
| <b>Faculty:</b> Faculty of Science   |      |  |       |       |      |
| <b>Course ID:</b> ÚMV/<br>MAN1d/10   |      | <b>Course name:</b> Mathematical analysis IV |       |       |      |
| <b>Course type, scope and the method:</b><br><b>Course type:</b> Lecture / Practice<br><b>Recommended course-load (hours):</b><br><b>Per week:</b> 4 / 2 <b>Per study period:</b> 56 / 28<br><b>Course method:</b> present   |      |  |       |       |      |
| <b>Number of ECTS credits:</b> 7   |      |  |       |       |      |
| <b>Recommended semester/trimester of the course:</b> 4.  |      |  |       |       |      |
| <b>Course level:</b> I.  |      |  |       |       |      |
| <b>Prerequisites:</b> ÚMV/MAN1c/10 and lebo ÚMV/MAN2c/10   |      |  |       |       |      |
| <b>Conditions for course completion:</b><br>exam   |      |  |       |       |      |
| <b>Learning outcomes:</b><br>Understanding of the basic rigorous ideas of Mathematical Analysis.   |      |  |       |       |      |
| <b>Brief outline of the course:</b><br>Metric spaces. Complete, compact and connected sets. Rings sigma-rings. Measure. Outer measure. Lebesgue measure. Measurable sets. Measurable functions. Lebesgue integral. Lebesgue integral versus Riemann integral. Calculations of Lebesgue integrals. Applications.  |      |  |       |       |      |
| <b>Recommended literature:</b><br>B. S. Thomson, J. B. Bruckner, A. M. Bruckner: Elementary Real Analysis, Prentice Hall, 2001.<br>A. M. Bruckner, J. B. Bruckner, B. S. Thomson: Real Analysis, Prentice Hall, 1997.<br>T. Neubrunn, B. Riečan: Miera a integrál, Veda, Bratislava, 1981.<br>B. Riečan, T. Neubrunn: Teória miery, Veda, Bratislava, 1992.<br>G. S. Nelson, A User-Friendly Introduction to Lebesgue Measure and Integration, American Mathematical Society, 2015 |      |  |       |       |      |
| <b>Course language:</b><br>Slovak  |      |  |       |       |      |
| <b>Notes:</b>  |      |  |       |       |      |
| <b>Course assessment</b><br>Total number of assessed students: 99  |      |  |       |       |      |
| A  | B    | C  | D     | E     | FX   |
| 3.03   | 7.07 | 15.15  | 16.16 | 56.57 | 2.02 |
| <b>Provides:</b> prof. RNDr. Jozef Doboš, CSc.   |      |  |       |       |      |
| <b>Date of last modification:</b> 04.03.2019   |      |  |       |       |      |
| <b>Approved:</b>   |      |  |       |       |      |

## COURSE INFORMATION LETTER

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|---|-------|--|-------|-------|------|
| <b>University:</b> P. J. Šafárik University in Košice   |       |  |       |       |      |
| <b>Faculty:</b> Faculty of Science  |       |  |       |       |      |
| <b>Course ID:</b> ÚMV/<br>MANb/19   |       | <b>Course name:</b> Mathematical analysis of function of real variable |       |       |      |
| <b>Course type, scope and the method:</b><br><b>Course type:</b> Lecture / Practice<br><b>Recommended course-load (hours):</b><br><b>Per week:</b> 4 / 3 <b>Per study period:</b> 56 / 42<br><b>Course method:</b> present  |       |  |       |       |      |
| <b>Number of ECTS credits:</b> 8  |       |  |       |       |      |
| <b>Recommended semester/trimester of the course:</b> 2.   |       |  |       |       |      |
| <b>Course level:</b> I.   |       |  |       |       |      |
| <b>Prerequisites:</b> ÚMV/FRPa/19   |       |  |       |       |      |
| <b>Conditions for course completion:</b><br>Two written test during semester and activity student to practice. Final evaluation is given by continuous assessment, written and oral part of the exam.   |       |  |       |       |      |
| <b>Learning outcomes:</b><br>The purpose of the course is to strengthen the knowledge in differential and integral calculus of real functions of one real variable and to develop computational skills in the field.  |       |  |       |       |      |
| <b>Brief outline of the course:</b><br>Limit and continuity of real functions, elementary functions. Differential calculus - derivatives of the first and of higher orders, the basic theorems of differential calculus and their use to study properties and behavior of functions.  |       |  |       |       |      |
| <b>Recommended literature:</b><br>1. Brannan, D.: A First Course in Mathematical Analysis, Cambridge University Press, Cambridge 2006.<br>2. Bruckner, A. M., Bruckner J. B., Thomson, B. S.: Real Analysis, Second Edition, ClassicalRealAnalysis.com, 2008.<br>3. Zorich, V. A.: Mathematical Analysis I, Springer-Verlag 2002. |       |  |       |       |      |
| <b>Course language:</b><br>Slovak   |       |  |       |       |      |
| <b>Notes:</b>   |       |  |       |       |      |
| <b>Course assessment</b><br>Total number of assessed students: 290  |       |  |       |       |      |
| A   | B     | C  | D     | E     | FX   |
| 10.34   | 11.03 | 16.55  | 22.76 | 34.48 | 4.83 |
| <b>Provides:</b> doc. RNDr. Ondrej Hutník, PhD., RNDr. Lenka Halčinová, PhD.  |       |  |       |       |      |
| <b>Date of last modification:</b> 17.02.2021  |       |  |       |       |      |
| <b>Approved:</b>  |       |  |       |       |      |

## COURSE INFORMATION LETTER

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|---|---|
| <b>University:</b> P. J. Šafárik University in Košice   |   |
| <b>Faculty:</b> Faculty of Science  |   |
| <b>Course ID:</b> ÚMV/<br>MSW/10  | <b>Course name:</b> Mathematical software |
| <b>Course type, scope and the method:</b><br><b>Course type:</b> Lecture / Practice<br><b>Recommended course-load (hours):</b><br><b>Per week:</b> 1 / 2 <b>Per study period:</b> 14 / 28<br><b>Course method:</b> present  |   |
| <b>Number of ECTS credits:</b> 3  |   |
| <b>Recommended semester/trimester of the course:</b> 2.   |   |
| <b>Course level:</b> I.   |   |
| <b>Prerequisites:</b>   |   |
| <b>Conditions for course completion:</b><br>Tests from both Excel and Maple<br>Given at the basis of partial tests.   |   |
| <b>Learning outcomes:</b><br>To develop student's knowledge and skills to use numerical and grafical representations of data and modelling by solving of various types of mathematical problems in different mathematical environments – environment of spreadsheet, R language or environment of system of symbolic calculations Maple.  |   |
| <b>Brief outline of the course:</b><br>The creation and use of formulas with mathematical functions, graphical and numerical solving of equations and systems of equations, utilize of arithmetical, graphical and stochastic models by solving of mathematical problems, linear optimalization. Basic description of Maple software and R language, manipulation with matrices and vectors, working with data and data files. Basic programming techniques, creation of user functions and scripts, graphical possibilities for data visualization. Manipulations of mathematical expressions, finding solutions of equalities and inequalities, mathematical analysis, linear algebra, number, graph and set theory in Maple. |   |
| <b>Recommended literature:</b><br>1. Shingareva, Lizárraga-Celaya: Maple and Mathematica. A problem solving approach for mathematics, Springer Wien NewYork, 2007<br>2. Eberhart: Maple problem solving handbook, University of Kentucky, 2009<br>3. Šťastný: Matematické a statistické výpočty v Microsoft Excelu, Computer Press 2001   |   |
| <b>Course language:</b><br>Slovak   |   |
| <b>Notes:</b>   |   |



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|---|------|-------|------|------|------|
| <b>Course assessment</b>  |      |       |      |      |      |
| Total number of assessed students: 162                                      |      |       |      |      |      |
| A   | B    | C     | D    | E    | FX   |
| 20.37   | 21.6 | 25.31 | 21.6 | 8.02 | 3.09 |
| <b>Provides:</b> doc. RNDr. Stanislav Lukáč, PhD., RNDr. Daniel Klein, PhD. |      |       |      |      |      |
| <b>Date of last modification:</b> 26.03.2019                                |      |       |      |      |      |
| <b>Approved:</b>  |      |       |      |      |      |

## COURSE INFORMATION LETTER

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|--|------|---|------|------|-----|
| <b>University:</b> P. J. Šafárik University in Košice  |      |   |      |      |     |
| <b>Faculty:</b> Faculty of Science   |      |   |      |      |     |
| <b>Course ID:</b> ÚMV/<br>MST/19   |      | <b>Course name:</b> Mathematical statistics |      |      |     |
| <b>Course type, scope and the method:</b><br><b>Course type:</b> Lecture / Practice<br><b>Recommended course-load (hours):</b><br><b>Per week:</b> 2 / 2 <b>Per study period:</b> 28 / 28<br><b>Course method:</b> present   |      |   |      |      |     |
| <b>Number of ECTS credits:</b> 5   |      |   |      |      |     |
| <b>Recommended semester/trimester of the course:</b> 5.  |      |   |      |      |     |
| <b>Course level:</b> I., II.   |      |   |      |      |     |
| <b>Prerequisites:</b>  |      |   |      |      |     |
| <b>Conditions for course completion:</b><br>To obtain at least 50% in two written tests during the semester. Total evaluation based on written tests and oral exam.  |      |   |      |      |     |
| <b>Learning outcomes:</b><br>Student should obtain the knowledge about basic statistical methods and the ability to apply theoretical knowledge in practical problems solving.   |      |   |      |      |     |
| <b>Brief outline of the course:</b><br>Random vectors, their distributions and characteristics. Joint and marginal distributions. Correlation and regression, properties of correlation coefficient. Random sample, sampling distributions and characteristics. Some important statistics and their distributions. Point estimators and their properties. Maximum likelihood method. Interval estimates, confidence interval construction. Testing of statistical hypothesis, critical region, level of significance. Methods for searching optimal critical regions. Some important parametric and nonparametric tests. |      |   |      |      |     |
| <b>Recommended literature:</b><br>1. Skřivánková V.: Pravdepodobnosť v príkladoch, UPJŠ, Košice, 2006 (in Slovak)<br>2. Skřivánková V.-Hančová M.: Štatistika v príkladoch, UPJŠ, Košice, 2005 (in Slovak)<br>3. CASELLA, G., BERGER, R., Statistical Inference, 2nd ed., Duxbury Press, 2002<br>4. DeGroot, M. H., Schervish, M. J.: Probability and Statistics, 4th ed., Pearson, Boston, 2012<br>5. Utts, J.M., Heckard, R.F.: Mind od Statistics, 5th ed., Thomson Brooks/Cole, 2014<br>6. Anděl J.: Základy matematické statistiky, MatfyzPress, Praha, 2011 (in Czech)   |      |   |      |      |     |
| <b>Course language:</b><br>Slovak  |      |   |      |      |     |
| <b>Notes:</b>  |      |   |      |      |     |
| <b>Course assessment</b><br>Total number of assessed students: 125   |      |   |      |      |     |
| A  | B    | C   | D    | E    | FX  |
| 20.8   | 21.6 | 15.2  | 21.6 | 13.6 | 7.2 |

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| <b>Provides:</b> RNDr. Martina Hančová, PhD. |
| <b>Date of last modification:</b> 18.03.2019 |
| <b>Approved:</b>                             |

## COURSE INFORMATION LETTER

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|--|-----|-------------------------------------|-----|-----|-----|
| <b>University:</b> P. J. Šafárik University in Košice  |     |                                     |     |     |     |
| <b>Faculty:</b> Faculty of Science   |     |                                     |     |     |     |
| <b>Course ID:</b> ÚMV/<br>MAP/19   |     | <b>Course name:</b> Matrix calculus |     |     |     |
| <b>Course type, scope and the method:</b><br><b>Course type:</b> Lecture / Practice<br><b>Recommended course-load (hours):</b><br><b>Per week:</b> 2 / 2 <b>Per study period:</b> 28 / 28<br><b>Course method:</b> present   |     |                                     |     |     |     |
| <b>Number of ECTS credits:</b> 5   |     |                                     |     |     |     |
| <b>Recommended semester/trimester of the course:</b> 3.  |     |                                     |     |     |     |
| <b>Course level:</b> I.  |     |                                     |     |     |     |
| <b>Prerequisites:</b> ÚMV/ALGa/10 and leboÚMV/ALG3b/10   |     |                                     |     |     |     |
| <b>Conditions for course completion:</b><br>Exam   |     |                                     |     |     |     |
| <b>Learning outcomes:</b><br>Mastering modern algebraic methods of applied mathematics.  |     |                                     |     |     |     |
| <b>Brief outline of the course:</b><br>Basic course of linear algebra is needed for mastering this course. Contents: Decompositions of matrices and their properties, eigenvalues and eigenvectors, trace of a matrix. Special matrices and their properties – symmetric, orthogonal, idempotent, toeplitz, positive definite and semidefinite, partitioned matrices. Inverse and pseudoinverse matrices. Linear space generated by the columns of a matrix, geometry of the space of matrices, orthogonal projectors. Special matrix products and operators of vectorization, permutation and commutation matrices. |     |                                     |     |     |     |
| <b>Recommended literature:</b><br>1. Seber, G.A.F.: A matrix handbook for statisticians. John Wiley & Sons, 2008<br>2. Searle, S.R., Khuri, A.I.: Matrix algebra useful for statistics. John Wiley & Sons, 2017.<br>3. Meyer, C.D.: Matrix Analysis and applied linear algebra. SIAM, 2000   |     |                                     |     |     |     |
| <b>Course language:</b><br>Slovak and English  |     |                                     |     |     |     |
| <b>Notes:</b>  |     |                                     |     |     |     |
| <b>Course assessment</b><br>Total number of assessed students: 0   |     |                                     |     |     |     |
| A  | B   | C                                   | D   | E   | FX  |
| 0.0  | 0.0 | 0.0                                 | 0.0 | 0.0 | 0.0 |
| <b>Provides:</b> prof. RNDr. Ivan Žežula, CSc., RNDr. Daniel Klein, PhD.   |     |                                     |     |     |     |
| <b>Date of last modification:</b> 28.03.2019   |     |                                     |     |     |     |
| <b>Approved:</b>   |     |                                     |     |     |     |

## COURSE INFORMATION LETTER

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|---|-------|------------------------------------|-------|-------|------|
| <b>University:</b> P. J. Šafárik University in Košice   |       |                                    |       |       |      |
| <b>Faculty:</b> Faculty of Science  |       |                                    |       |       |      |
| <b>Course ID:</b> ÚMV/<br>MIE/13  |       | <b>Course name:</b> Microeconomics |       |       |      |
| <b>Course type, scope and the method:</b><br><b>Course type:</b> Lecture / Practice<br><b>Recommended course-load (hours):</b><br><b>Per week:</b> 2 / 1 <b>Per study period:</b> 28 / 14<br><b>Course method:</b> present  |       |                                    |       |       |      |
| <b>Number of ECTS credits:</b> 4  |       |                                    |       |       |      |
| <b>Recommended semester/trimester of the course:</b> 1., 3.   |       |                                    |       |       |      |
| <b>Course level:</b> I.   |       |                                    |       |       |      |
| <b>Prerequisites:</b>   |       |                                    |       |       |      |
| <b>Conditions for course completion:</b><br>The minimum necessary number of points from tests written during semester is 50%, plus the ability of verbal argumentation in the final oral exam.  |       |                                    |       |       |      |
| <b>Learning outcomes:</b><br>Understanding of basic principles of microeconomics and ability to apply them in practical situations.   |       |                                    |       |       |      |
| <b>Brief outline of the course:</b><br>Economics and economy. Supply and demand. Consumer Theory. Theory of firm. Perfect competition. Monopoly. Labour market. Market failure. Externalities and Public goods.   |       |                                    |       |       |      |
| <b>Recommended literature:</b><br>1. <a href="http://umv.science.upjs.sk/cechlarova/MIE/MIE.htm">http://umv.science.upjs.sk/cechlarova/MIE/MIE.htm</a> - podklady k prednáška, testy na cvičenia, materiály z dennej tlače<br>2. H.L. Varian, Intermediate Mikroekonomics, WW Norton, 1993<br>3. J.M. Perloff, Microeconomics, 6th Edition, Addison Wesley, 2012<br>4. J. Sloman, Economics, 6th Edition, Prentice Hall, 2006 |       |                                    |       |       |      |
| <b>Course language:</b><br>Slovak   |       |                                    |       |       |      |
| <b>Notes:</b>   |       |                                    |       |       |      |
| <b>Course assessment</b><br>Total number of assessed students: 79   |       |                                    |       |       |      |
| A   | B     | C                                  | D     | E     | FX   |
| 22.78   | 24.05 | 17.72                              | 18.99 | 13.92 | 2.53 |
| <b>Provides:</b> prof. RNDr. Katarína Cechlárová, DrSc., RNDr. Veronika Jurková, PhD.   |       |                                    |       |       |      |
| <b>Date of last modification:</b> 03.05.2015  |       |                                    |       |       |      |
| <b>Approved:</b>  |       |                                    |       |       |      |

## COURSE INFORMATION LETTER

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|--|-------|---|-------|-------|-------|
| <b>University:</b> P. J. Šafárik University in Košice  |       |   |       |       |       |
| <b>Faculty:</b> Faculty of Science   |       |   |       |       |       |
| <b>Course ID:</b> ÚMV/<br>NMT/10   |       | <b>Course name:</b> Numerical mathematics |       |       |       |
| <b>Course type, scope and the method:</b><br><b>Course type:</b> Lecture / Practice<br><b>Recommended course-load (hours):</b><br><b>Per week:</b> 4 / 3 <b>Per study period:</b> 56 / 42<br><b>Course method:</b> present   |       |   |       |       |       |
| <b>Number of ECTS credits:</b> 8   |       |   |       |       |       |
| <b>Recommended semester/trimester of the course:</b> 4.  |       |   |       |       |       |
| <b>Course level:</b> I.  |       |   |       |       |       |
| <b>Prerequisites:</b> ÚMV/MAN1c/10, ÚMV/ALG1c/10   |       |   |       |       |       |
| <b>Conditions for course completion:</b><br>During semester it is possible to obtain at maximum 30 points for creating, debugging and explaining of functioning of programmes devoted to numerical methods. A student is eligible for the oral part of examination after obtaining at least 10 out of the mentioned 30 points. On the oral part of examination a student answers two questions chosen by him/her at random, one from the group A (40 points at maximum) and one from the group B (30 points at maximum). Evaluation scale: A ... 90-100 p., B ... 80-89 p., C ... 70-79 p., D ... 60-69 p., E ... 50-59 p., FX ... 0-49 p. |       |   |       |       |       |
| <b>Learning outcomes:</b><br>A student gets acquainted with basic numerical methods, with conditions of their use and with errors accompanying approximations by numerical methods. He/she practically tests his/her own computer programmes corresponding to some numerical methods.  |       |   |       |       |       |
| <b>Brief outline of the course:</b><br>Interpolation (ordinary, generalised). Numerical differentiation. Numerical integration (rules, errors). Gaussian quadrature. Interval-halving method. Regula falsi method. Newton's method. Method of successive iterations. Bernoulli's method. LU-decomposition. Method of least squares.  |       |   |       |       |       |
| <b>Recommended literature:</b><br>A. Ralston, A First Course in Numerical Analysis, McGraw-Hill, New York 1965<br>A. Björck and G. Dahlquist, Numerical Methods, Prentice-Hall, Englewood Cliffs 1974; reprint Dover Publications, Mineola 2003  |       |   |       |       |       |
| <b>Course language:</b><br>Slovak  |       |   |       |       |       |
| <b>Notes:</b>  |       |   |       |       |       |
| <b>Course assessment</b><br>Total number of assessed students: 115   |       |   |       |       |       |
| A  | B     | C   | D     | E     | FX    |
| 6.96   | 16.52 | 6.09                                      | 13.91 | 41.74 | 14.78 |
| <b>Provides:</b> prof. RNDr. Mirko Horňák, CSc.  |       |   |       |       |       |

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| <b>Date of last modification:</b> 03.05.2015 |
| <b>Approved:</b>                             |

## COURSE INFORMATION LETTER

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| <b>University:</b> P. J. Šafárik University in Košice  |      |   |     |     |     |
| <b>Faculty:</b> Faculty of Science   |      |   |     |     |     |
| <b>Course ID:</b> ÚMV/<br>POV/10   |      | <b>Course name:</b> Practical operations research |     |     |     |
| <b>Course type, scope and the method:</b><br><b>Course type:</b> Lecture / Practice<br><b>Recommended course-load (hours):</b><br><b>Per week:</b> 1 / 2 <b>Per study period:</b> 14 / 28<br><b>Course method:</b> present |      |   |     |     |     |
| <b>Number of ECTS credits:</b> 3   |      |   |     |     |     |
| <b>Recommended semester/trimester of the course:</b> 6.  |      |   |     |     |     |
| <b>Course level:</b> I.  |      |   |     |     |     |
| <b>Prerequisites:</b>  |      |   |     |     |     |
| <b>Conditions for course completion:</b><br>Based on evaluation of individual projects.  |      |   |     |     |     |
| <b>Learning outcomes:</b><br>To provide the basics of mathematical modelling of real-world problems and selected methods of solving the problems of uni- and multicriterial optimization                                   |      |   |     |     |     |
| <b>Brief outline of the course:</b><br>Elements of decision theory, games against nature. Mathematical modelling of real-world problems. Linear and nonlinear models. Multicriterial optimization.                         |      |   |     |     |     |
| <b>Recommended literature:</b><br>electronic information sources   |      |   |     |     |     |
| <b>Course language:</b><br>Slovak  |      |   |     |     |     |
| <b>Notes:</b>  |      |   |     |     |     |
| <b>Course assessment</b><br>Total number of assessed students: 40  |      |   |     |     |     |
| A  | B    | C   | D   | E   | FX  |
| 62.5   | 25.0 | 7.5   | 0.0 | 5.0 | 0.0 |
| <b>Provides:</b> prof. RNDr. Tomáš Madaras, PhD.   |      |   |     |     |     |
| <b>Date of last modification:</b> 03.05.2015   |      |   |     |     |     |
| <b>Approved:</b>   |      |   |     |     |     |



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| <b>University:</b> P. J. Šafárik University in Košice  |  |
| <b>Faculty:</b> Faculty of Science   |  |
| <b>Course ID:</b> ÚMV/<br>ZUC/10   | <b>Course name:</b> Principles of book-keeping |
| <b>Course type, scope and the method:</b><br><b>Course type:</b> Lecture / Practice<br><b>Recommended course-load (hours):</b><br><b>Per week:</b> 2 / 2 <b>Per study period:</b> 28 / 28<br><b>Course method:</b> present   |  |
| <b>Number of ECTS credits:</b> 4   |  |
| <b>Recommended semester/trimester of the course:</b> 5.  |  |
| <b>Course level:</b> I.  |  |
| <b>Prerequisites:</b>  |  |
| <b>Conditions for course completion:</b><br>Three tests: single-entry accountig (complex example), double-entry accounting (complex example), conceptual apparatus of accounting. The final evaluation is given at the basis of partial tests.   |  |
| <b>Learning outcomes:</b><br>To learn basics of economic conceptual and procedural apparatus of accounting.  |  |
| <b>Brief outline of the course:</b><br>The history and legal regulations of accounting. Structure of accounting in a bussines company, bank and insurance company; accounting information system. Various kinds of business, trade licence and trade law. Company subjects, banks and insurance companies - the financial instruments. Single-entry accountig system, statements. Assets and its sources. Assets and liability pricing. Balance principle. Assets and liabilities list. Balance sheet, structure of assets and liabilities. Double-entry accounting records. Account, accounting on accounts of balance sheet and income statement. Synthetic and analytical records. Account classification of business companies, banks and insurance companies, the principles of its construction. Balance sheet, income statement. Financial statement (simple and consolidated). |  |
| <b>Recommended literature:</b><br>Soukupová B., Šlosárová A., Baštincová A.: Účtovníctvo. Bratislava: Iura Edition, 2001<br>Máziková a kol.: Účtovníctvo (učebné texty). Bratislava: Iura Edition, 2009<br>Beňová E. a kol.: Financie a mena. Bratislava: Iura Edition, 2005<br>The Law of NR SR no. 43/2002 Z. z. on accounting, the law on income tax no. 595/2003 Z. z.   |  |
| <b>Course language:</b><br>Slovak  |  |
| <b>Notes:</b>  |  |

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| <b>Course assessment</b>                     |      |      |      |      |      |
| Total number of assessed students: 80        |      |      |      |      |      |
| A  | B    | C    | D    | E    | FX   |
| 16.25  | 20.0 | 32.5 | 17.5 | 12.5 | 1.25 |
| <b>Provides:</b> RNDr. Daniel Klein, PhD.    |      |      |      |      |      |
| <b>Date of last modification:</b> 03.05.2015 |      |      |      |      |      |
| <b>Approved:</b>                             |      |      |      |      |      |

## COURSE INFORMATION LETTER

|  |       |  |      |       |     |
|--|-------|--|------|-------|-----|
| <b>University:</b> P. J. Šafárik University in Košice  |       |  |      |       |     |
| <b>Faculty:</b> Faculty of Science   |       |  |      |       |     |
| <b>Course ID:</b> ÚMV/<br>TPP/19   |       | <b>Course name:</b> Probability theory |      |       |     |
| <b>Course type, scope and the method:</b><br><b>Course type:</b> Lecture / Practice<br><b>Recommended course-load (hours):</b><br><b>Per week:</b> 2 / 2 <b>Per study period:</b> 28 / 28<br><b>Course method:</b> present   |       |  |      |       |     |
| <b>Number of ECTS credits:</b> 5   |       |  |      |       |     |
| <b>Recommended semester/trimester of the course:</b> 4.  |       |  |      |       |     |
| <b>Course level:</b> I.  |       |  |      |       |     |
| <b>Prerequisites:</b> ÚMV/MAN1c/10 and lebo ÚMV/MAN2c/10 and lebo ÚMV/FRPa/19  |       |  |      |       |     |
| <b>Conditions for course completion:</b><br>To obtain at least 50% in two written tests during the semester.<br>Total evaluation based on written tests and oral exam.   |       |  |      |       |     |
| <b>Learning outcomes:</b><br>To obtain knowledge of the axiomatic theory of probability, random variables and their characteristics, special types of distributions and their applications.  |       |  |      |       |     |
| <b>Brief outline of the course:</b><br>Probability space, definitions and properties of probability. Conditional probability and independence. Random variables, their distribution function and characteristics. Mean, variance and skewness.. Discrete and absolutely continuous distributions. Quantile and characteristic functions, their properties. Relation between characteristic function and moments. Median and mode. Transformation of random variables. Special types of distributions with applications (binomial, Poisson, geometric, uniform, exponential, normal, chí-square, Student, Fisher). Central limit theorem. |       |  |      |       |     |
| <b>Recommended literature:</b><br>1. Skřivánková V.: Pravdepodobnosť v príkladoch, UPJŠ, Košice, 2006 (in Slovak)<br>2. DeGroot, M. H., Schervish, M. J.: Probability and Statistics, 4th ed., Pearson, Boston, 2012<br>3. Evans, M. J., Rosenthal, J. S.: Probability and Statistics: The Science of Uncertainty, 2nd Ed., W. H. Freeman, 2009<br>4. Riečan et al.: Pravdepodobnosť a matematická štatistika, Alfa, Bratislava, 1984 (in Slovak)  |       |  |      |       |     |
| <b>Course language:</b><br>Slovak  |       |  |      |       |     |
| <b>Notes:</b>  |       |  |      |       |     |
| <b>Course assessment</b><br>Total number of assessed students: 306   |       |  |      |       |     |
| A  | B     | C                                      | D    | E     | FX  |
| 12.42  | 14.05 | 19.28                                  | 23.2 | 22.55 | 8.5 |

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| <b>Provides:</b> RNDr. Daniel Klein, PhD.    |
| <b>Date of last modification:</b> 11.03.2019 |
| <b>Approved:</b>                             |

## COURSE INFORMATION LETTER

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|--|---|
| <b>University:</b> P. J. Šafárik University in Košice  |   |
| <b>Faculty:</b> Faculty of Science   |   |
| <b>Course ID:</b> ÚINF/<br>PAZ1a/15  | <b>Course name:</b> Programming, algorithms, and complexity |
| <b>Course type, scope and the method:</b><br><b>Course type:</b> Lecture / Practice<br><b>Recommended course-load (hours):</b><br><b>Per week:</b> 3 / 4 <b>Per study period:</b> 42 / 56<br><b>Course method:</b> present   |   |
| <b>Number of ECTS credits:</b> 8   |   |
| <b>Recommended semester/trimester of the course:</b> 1.  |   |
| <b>Course level:</b> I., II.   |   |
| <b>Prerequisites:</b>  |   |
| <b>Conditions for course completion:</b><br>Graded activities during semester: assignments, small exams, midterm, final project.<br>Final examination: practical finalterm focused on a complex task.<br>Rules to pass the subject: Pass the minimal limit of points for category of homeworks (assignments, final project) and tests (small exams, midterm). Get at least 42% from the finalterm and pass the defined limit of total points for all graded activities.  |   |
| <b>Learning outcomes:</b><br>Get an ability to implement basic Java programs and obtain essential knowledge related to object-oriented programming.  |   |
| <b>Brief outline of the course:</b> <ol style="list-style-type: none"> <li>1. Introduction to Java and JPAZ2 framework, first Eclipse project, interactive communication with objects using turtle graphics, repeating code in loops, notion of class, object, and method.</li> <li>2. For-loops, local variables, variable types, arithmetic expressions, random numbers, random walk, conditions.</li> <li>3. While-loop, returning a value from a method, reference and reference variables, debugging.</li> <li>4. Primitive and reference types, chars, String objects (including basic algorithms), mouse events, instance variables.</li> <li>5. Array of primitive values and array of references, simple array algorithms.</li> <li>6. Advanced array algorithms, two-dimensional array.</li> <li>7. Exceptions and exception handling, files and directories, writing to text files.</li> <li>8. Reading from text files.</li> <li>9. Creating classes, encapsulation, getters and setters, constructors and their hierarchy, method overloading.</li> <li>10. Inheritance and polymorphism.</li> <li>11. Java Collections Framework, ArrayList class, wrapper classes for primitive types and autoboxing, interfaces List, Set, Map and their implementations, methods equals and hashCode.</li> <li>12. Access modifiers, abstract classes and methods, creating and implementing interfaces, sorting, static methods and variables.</li> <li>13. Creating and throwing exceptions, checked and runtime exceptions, JavaDoc, Maven.</li> </ol> |   |
| <b>Recommended literature:</b>   |   |

1. ECKEL, Bruce. Thinking in Java. Fourth edition. Upper Saddle River, NJ: Prentice Hall, c[2006]. ISBN 978-01-318-7248-6.
2. PECINOVSKÝ, Rudolf. OOP: naučte se myslet a programovat objektově. Brno: Computer Press, 2010. ISBN 978-80-251-2126-9.
3. SIERRA, Kathy a Bert BATES. Head first Java. Vyd. 2. Sebastopol: O'Reilly, 2005. ISBN 978-05-960-0920-5.

**Course language:**

Slovak language, english language is required only to read Java API documentation.

**Notes:**

**Course assessment**

Total number of assessed students: 717

| A     | B    | C     | D     | E     | FX    |
|-------|------|-------|-------|-------|-------|
| 16.18 | 7.39 | 11.44 | 15.48 | 15.06 | 34.45 |

**Provides:** RNDr. Juraj Šebej, PhD., RNDr. Zuzana Bednárová, PhD., RNDr. Miroslav Opiela, PhD., Mgr. Antónia Matisová, Mgr. Zoltán Szoplák

**Date of last modification:** 31.08.2021

**Approved:**

## COURSE INFORMATION LETTER

|   |   |
|---|---|
| <b>University:</b> P. J. Šafárik University in Košice   |   |
| <b>Faculty:</b> Faculty of Science  |   |
| <b>Course ID:</b> ÚINF/<br>PAZ1b/15   | <b>Course name:</b> Programming, algorithms, and complexity |
| <b>Course type, scope and the method:</b><br><b>Course type:</b> Lecture / Practice<br><b>Recommended course-load (hours):</b><br><b>Per week:</b> 2 / 4 <b>Per study period:</b> 28 / 56<br><b>Course method:</b> present  |   |
| <b>Number of ECTS credits:</b> 7  |   |
| <b>Recommended semester/trimester of the course:</b> 2.   |   |
| <b>Course level:</b> I., II.  |   |
| <b>Prerequisites:</b> ÚINF/PAZ1a/15   |   |
| <b>Conditions for course completion:</b><br>Graded activities during semester: assignments, small theoretical exams, practical and theoretical midterm.<br>Final examination: practical and theoretical finalterm.<br>Rules to pass the subject: Get at least 50% from theoretical activities (small exams, theoretical midterm and theoretical finalterm) and from practical activities (practical midterm and finalterm).<br>Pass the defined limit of total points for all graded activities.  |   |
| <b>Learning outcomes:</b><br>To know essential algorithms, data structures, and methods used for efficient algorithms design.<br>To understand time complexity analysis. To practice efficient implementation of algorithms. To recognize combinatorial and graph algorithms.   |   |
| <b>Brief outline of the course:</b> <ol style="list-style-type: none"> <li>1. Recursion and fractals.</li> <li>2. Binary search, basic sorting algorithms, time complexity analysis, O-notation.</li> <li>3. Basic data structures and algorithms: linked list, stack, queue.</li> <li>4. Trees and their applications.</li> <li>5. Efficient sorting algorithms (QuickSort, MergeSort, HeapSort).</li> <li>6. Backtracking.</li> <li>7. Dynamic programming, divide and conquer strategy.</li> <li>8. Unweighted graphs, graph traversal, graph topological sort.</li> <li>9. Weighted graphs, the shortest path algorithms.</li> <li>10. Minimum spanning tree, greedy algorithms.</li> <li>11. Hashing, amortized time complexity, string-searching algorithms.</li> </ol> |   |
| <b>Recommended literature:</b> <ol style="list-style-type: none"> <li>1. WRÓBLEWSKI, Piotr. Algoritmy: datové struktury a programovací techniky. Brno: Computer Press, 2004. ISBN 80-251-0343-9.</li> <li>2. CORMEN, Thomas H. Introduction to algorithms. 3rd ed. Cambridge: MIT Press, c2009. ISBN 978-0-262-03384-8.</li> <li>3. KLEINBERG, Jon a Éva TARDOS. Algorithm design. Thirteenth impression. Noida, India: Pearson, c2014. ISBN 9789332518643.</li> </ol>  |   |

4. MAREŠ, Martin a Tomáš VALLA. Průvodce labyrintem algoritmů. Praha: CZ.NIC, z.s.p.o., 2017. CZ.NIC. ISBN 978-80-88168-19-5.

**Course language:**

Slovak language, literature is available in english and czech language.

**Notes:**

**Course assessment**

Total number of assessed students: 1222

| A     | B    | C   | D     | E     | FX    |
|-------|------|-----|-------|-------|-------|
| 13.75 | 7.53 | 9.9 | 19.31 | 21.52 | 27.99 |

**Provides:** RNDr. Zuzana Bednárová, PhD., RNDr. Juraj Šebej, PhD., RNDr. Miroslav Opiela, PhD., Mgr. Antónia Matisová, Mgr. Gabriela Vozáriková

**Date of last modification:** 31.08.2021

**Approved:**



## COURSE INFORMATION LETTER

|   |  |
|---|--|
| <b>University:</b> P. J. Šafárik University in Košice   |  |
| <b>Faculty:</b> Faculty of Science  |  |
| <b>Course ID:</b> ÚTVŠ/<br>ÚTVŠ/CM/13   | <b>Course name:</b> Seaside Aerobic Exercise |
| <b>Course type, scope and the method:</b><br><b>Course type:</b> Practice<br><b>Recommended course-load (hours):</b><br><b>Per week: Per study period:</b> 36s<br><b>Course method:</b> combined, present   |  |
| <b>Number of ECTS credits:</b> 2  |  |
| <b>Recommended semester/trimester of the course:</b>  |  |
| <b>Course level:</b> I., II.  |  |
| <b>Prerequisites:</b>   |  |
| <b>Conditions for course completion:</b><br>Conditions for course completion:<br>Attendance   |  |
| <b>Learning outcomes:</b><br>Learning outcomes:<br>Students will be provided an overview of possibilities how to spend leisure time in seaside conditions actively and their skills in work and communication with clients will be improved. Students will acquire practical experience in organising the cultural and art-oriented events, with the aim to improve the stay and to create positive experiences for visitors.   |  |
| <b>Brief outline of the course:</b><br>Brief outline of the course:<br>1. Basics of seaside aerobics<br>2. Morning exercises<br>3. Pilates and its application in seaside conditions<br>4. Exercises for the spine<br>5. Yoga basics<br>6. Sport as a part of leisure time<br>7. Application of projects of productive spending of leisure time for different age and social groups (children, young people, elderly)<br>8. Application of seaside cultural and art-oriented activities in leisure time |  |
| <b>Recommended literature:</b>  |  |
| <b>Course language:</b>   |  |
| <b>Notes:</b>   |  |
| <b>Course assessment</b><br>Total number of assessed students: 41   |  |
| abs   | n  |
| 12.2  | 87.8   |

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| <b>Provides:</b> Mgr. Agata Horbach, PhD.    |
| <b>Date of last modification:</b> 15.03.2019 |
| <b>Approved:</b>                             |

## COURSE INFORMATION LETTER

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|--|-------|---|------|------|------|
| <b>University:</b> P. J. Šafárik University in Košice  |       |   |      |      |      |
| <b>Faculty:</b> Faculty of Science   |       |   |      |      |      |
| <b>Course ID:</b> ÚMV/<br>SMA/10   |       | <b>Course name:</b> Seminar in macroeconomics |      |      |      |
| <b>Course type, scope and the method:</b><br><b>Course type:</b> Practice<br><b>Recommended course-load (hours):</b><br><b>Per week:</b> 2 <b>Per study period:</b> 28<br><b>Course method:</b> present  |       |   |      |      |      |
| <b>Number of ECTS credits:</b> 2   |       |   |      |      |      |
| <b>Recommended semester/trimester of the course:</b> 2., 4.  |       |   |      |      |      |
| <b>Course level:</b> I.  |       |   |      |      |      |
| <b>Prerequisites:</b> ÚMV/MAE/10   |       |   |      |      |      |
| <b>Conditions for course completion:</b><br>Active work during semester, acceptable results of projects and their presentation in the class.   |       |   |      |      |      |
| <b>Learning outcomes:</b><br>Extend the knowledge acquired in Macroeconomics.  |       |   |      |      |      |
| <b>Brief outline of the course:</b><br>The work in seminar consists of study of extended topics in Macroeconomics, projects aimed at collecting and interpreting data, work with recent journal and newspapers publications.   |       |   |      |      |      |
| <b>Recommended literature:</b><br>[B] Olivier Blanchard, Alessia Amighini, Francesco Giavazzi: MACROECONOMICS, A EUROPEAN PERSPECTIVE, Pearson Education, 2010<br>[M] N.GREGORY MANKIW, MACROECONOMICS, 7th Edition, Harvard University, Worth Publishers 2009<br>Newspapers and journals, in particular The Economist, Hospodárske noviny, SME. |       |   |      |      |      |
| <b>Course language:</b><br>Slovak  |       |   |      |      |      |
| <b>Notes:</b>  |       |   |      |      |      |
| <b>Course assessment</b><br>Total number of assessed students: 59  |       |   |      |      |      |
| A  | B     | C   | D    | E    | FX   |
| 32.2   | 40.68 | 15.25   | 5.08 | 5.08 | 1.69 |
| <b>Provides:</b> prof. RNDr. Katarína Cechlárová, DrSc.  |       |   |      |      |      |
| <b>Date of last modification:</b> 31.01.2019   |       |   |      |      |      |
| <b>Approved:</b>   |       |   |      |      |      |

## COURSE INFORMATION LETTER

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|--|-------|---|-------|------|-----|
| <b>University:</b> P. J. Šafárik University in Košice  |       |   |       |      |     |
| <b>Faculty:</b> Faculty of Science   |       |   |       |      |     |
| <b>Course ID:</b> ÚMV/<br>SMI/10   |       | <b>Course name:</b> Seminar in microeconomics |       |      |     |
| <b>Course type, scope and the method:</b><br><b>Course type:</b> Practice<br><b>Recommended course-load (hours):</b><br><b>Per week:</b> 2 <b>Per study period:</b> 28<br><b>Course method:</b> present  |       |   |       |      |     |
| <b>Number of ECTS credits:</b> 2   |       |   |       |      |     |
| <b>Recommended semester/trimester of the course:</b> 2., 4.  |       |   |       |      |     |
| <b>Course level:</b> I.  |       |   |       |      |     |
| <b>Prerequisites:</b> ÚMV/MIE/13   |       |   |       |      |     |
| <b>Conditions for course completion:</b><br>Active work during semester, acceptable results of projects and their presentation in the class.   |       |   |       |      |     |
| <b>Learning outcomes:</b><br>Extend the knowledge and skills obtained in the subject Microeconomics.   |       |   |       |      |     |
| <b>Brief outline of the course:</b><br>The work in seminar consists of study of extended topics in Microeconomics, projects aimed at collecting and interpreting data, work with recent journal and newspapers publications.   |       |   |       |      |     |
| <b>Recommended literature:</b><br>1. Newspapers and journals<br>2. H.L. Varian, Mikroekonomie, Victoria Publishing, Praha, 1995/ Varian: Intermediate Microeconomics, W.W. Norton, 1993<br>3. J.M. Perloff, Microeconomics, 6th Edition, Addison Wesley, 2012<br>4. J. Sloman, Economics, 6th Edition, Prentice Hall, 2006 |       |   |       |      |     |
| <b>Course language:</b><br>Slovak or English   |       |   |       |      |     |
| <b>Notes:</b>  |       |   |       |      |     |
| <b>Course assessment</b><br>Total number of assessed students: 51  |       |   |       |      |     |
| A  | B     | C   | D     | E    | FX  |
| 49.02  | 11.76 | 17.65   | 13.73 | 7.84 | 0.0 |
| <b>Provides:</b> prof. RNDr. Katarína Cechlárová, DrSc.  |       |   |       |      |     |
| <b>Date of last modification:</b> 03.05.2015   |       |   |       |      |     |
| <b>Approved:</b>   |       |   |       |      |     |

## COURSE INFORMATION LETTER

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|---|---|
| <b>University:</b> P. J. Šafárik University in Košice   |   |
| <b>Faculty:</b> Faculty of Science  |   |
| <b>Course ID:</b> ÚMV/<br>SHM/10  | <b>Course name:</b> Seminar on history of mathematics |
| <b>Course type, scope and the method:</b><br><b>Course type:</b> Practice<br><b>Recommended course-load (hours):</b><br><b>Per week:</b> 2 <b>Per study period:</b> 28<br><b>Course method:</b> present   |   |
| <b>Number of ECTS credits:</b> 2  |   |
| <b>Recommended semester/trimester of the course:</b> 6.   |   |
| <b>Course level:</b> I., II.  |   |
| <b>Prerequisites:</b>   |   |
| <b>Conditions for course completion:</b><br>Homework, presentation on the chosen topic during the seminar.<br>More than 91 points - evaluation of A.<br>81-90 points - evaluation of B.<br>71-80 points - rating C.<br>61-70 points - evaluation of D.<br>51-60 points - evaluation of E.<br>Less than 50 points - FX evaluation.   |   |
| <b>Learning outcomes:</b><br>Students get an overview of the history of the development of certain mathematical disciplines and selected terms and about parallel between phylogenesis and ontogenesis of mathematical thinking.  |   |
| <b>Brief outline of the course:</b><br>Mathematics in Early Civilizations. Greek Mathematics. Mathematics in the Near and Far East (Arabia, China, India). Medieval European Mathematics. The Renaissance of Mathematics. The Beginning of Modern Mathematics.  |   |
| <b>Recommended literature:</b><br>Burton, D. M.: The History of Mathematics: An Introduction. McGraw–Hill, 2007.<br>Devlin, K.: Jazyk matematiky. Dokořán, 2002 (in czech)<br>Kolman, A.: Dejiny matematiky ve starověku. Academia, Praha, 1968 (in slovak)<br>Juškevič, A. P.: Dejiny matematiky ve středověku. Academia, Praha 1977 (in slovak)<br>Znáň, Š. a kol.: Pohľad do dejín matematiky. Alfa, Bratislava, 1986 (in slovak)<br>Konforovič, A.G.: Významné matematické úlohy, SPN Praha, 1989 (in slovak) |   |
| <b>Course language:</b><br>Slovak   |   |
| <b>Notes:</b>   |   |

|   |      |      |      |      |     |
|---|------|------|------|------|-----|
| <b>Course assessment</b>                              |      |      |      |      |     |
| Total number of assessed students: 112                |      |      |      |      |     |
| A   | B    | C    | D    | E    | FX  |
| 74.11   | 9.82 | 8.93 | 3.57 | 3.57 | 0.0 |
| <b>Provides:</b> doc. RNDr. Ingrid Semanišínová, PhD. |      |      |      |      |     |
| <b>Date of last modification:</b> 03.05.2015          |      |      |      |      |     |
| <b>Approved:</b>                                      |      |      |      |      |     |

## COURSE INFORMATION LETTER

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| <b>University:</b> P. J. Šafárik University in Košice  |  |
| <b>Faculty:</b> Faculty of Science   |  |
| <b>Course ID:</b> ÚTVŠ/<br>TVa/11  | <b>Course name:</b> Sports Activities I. |
| <b>Course type, scope and the method:</b><br><b>Course type:</b> Practice<br><b>Recommended course-load (hours):</b><br><b>Per week:</b> 2 <b>Per study period:</b> 28<br><b>Course method:</b> combined, present  |  |
| <b>Number of ECTS credits:</b> 2   |  |
| <b>Recommended semester/trimester of the course:</b> 1.  |  |
| <b>Course level:</b> I., I.II., II.  |  |
| <b>Prerequisites:</b>  |  |
| <b>Conditions for course completion:</b><br>Min. 80% of active participation in classes.   |  |
| <b>Learning outcomes:</b><br>Sports activities in all their forms prepare university students for their professional and personal life. They have a great impact on physical fitness and performance. Specialization in sports activities enables students to strengthen their relationship towards the selected sport in which they also improve.   |  |
| <b>Brief outline of the course:</b><br>Brief outline of the course:<br>Within the optional subject, the Institute of Physical Education and Sports of Pavol Jozef Šafárik University provides for students the following sports activities: aerobics, aikido, basketball, badminton, body form, bouldering, floorball, yoga, power yoga, pilates, swimming, body-building, indoor football, S-M systems, step aerobics, table tennis, tennis, volleyball and chess.<br>In the first two semesters of the first level of education students will master basic characteristics and particularities of individual sports, motor skills, game activities, they will improve level of their physical condition, coordination abilities, physical performance, and motor performance fitness. Last but not least, the important role of sports activities is to eliminate swimming illiteracy and by means of a special program of medical physical education to influence and mitigate unfitness.<br>In addition to these sports, the Institute offers for those who are interested winter and summer physical education trainings with an attractive program and organises various competitions, either at the premises of the faculty or University or competitions with national or international participation. |  |
| <b>Recommended literature:</b>   |  |
| <b>Course language:</b>  |  |
| <b>Notes:</b>  |  |

| <b>Course assessment</b>  |       |       |       |       |       |     |       |
|---|-------|-------|-------|-------|-------|-----|-------|
| Total number of assessed students: 12859  |       |       |       |       |       |     |       |
| abs   | abs-A | abs-B | abs-C | abs-D | abs-E | n   | neabs |
| 87.01   | 0.08  | 0.0   | 0.0   | 0.0   | 0.04  | 8.1 | 4.77  |
| <b>Provides:</b> Mgr. Agata Horbacz, PhD., Mgr. Dávid Kaško, PhD., Mgr. Zuzana Küchelová, PhD., doc. PaedDr. Ivan Uher, PhD., prof. RNDr. Stanislav Vokál, DrSc., Mgr. Marcel Čurgali, Mgr. Patrik Berta, Mgr. Ladislav Kručanica, PhD., Bc. Richard Melichar, Mgr. Petra Tomková, PhD. |       |       |       |       |       |     |       |
| <b>Date of last modification:</b> 13.05.2021  |       |       |       |       |       |     |       |
| <b>Approved:</b>  |       |       |       |       |       |     |       |



## COURSE INFORMATION LETTER

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|--|-------|---|-------|-------|-------|-------|-------|
| <b>University:</b> P. J. Šafárik University in Košice  |       |   |       |       |       |       |       |
| <b>Faculty:</b> Faculty of Science   |       |   |       |       |       |       |       |
| <b>Course ID:</b> ÚTVŠ/<br>TVb/11  |       | <b>Course name:</b> Sports Activities II. |       |       |       |       |       |
| <b>Course type, scope and the method:</b><br><b>Course type:</b> Practice<br><b>Recommended course-load (hours):</b><br><b>Per week:</b> 2 <b>Per study period:</b> 28<br><b>Course method:</b> combined, present  |       |   |       |       |       |       |       |
| <b>Number of ECTS credits:</b> 2   |       |   |       |       |       |       |       |
| <b>Recommended semester/trimester of the course:</b> 2.  |       |   |       |       |       |       |       |
| <b>Course level:</b> I., I.II., II.  |       |   |       |       |       |       |       |
| <b>Prerequisites:</b>  |       |   |       |       |       |       |       |
| <b>Conditions for course completion:</b><br>active participation in classes - min. 80%.  |       |   |       |       |       |       |       |
| <b>Learning outcomes:</b><br>Sports activities in all their forms prepare university students for their professional and personal life. They have a great impact on physical fitness and performance. Specialization in sports activities enables students to strengthen their relationship towards the selected sport in which they also improve.   |       |   |       |       |       |       |       |
| <b>Brief outline of the course:</b><br>Within the optional subject, the Institute of Physical Education and Sports of Pavol Jozef Šafárik University provides for students the following sports activities: aerobics, aikido, basketball, badminton, body form, bouldering, floorball, yoga, power yoga, pilates, swimming, body-building, indoor football, S-M systems, step aerobics, table tennis, tennis, volleyball and chess.<br>In the first two semesters of the first level of education students will master basic characteristics and particularities of individual sports, motor skills, game activities, they will improve level of their physical condition, coordination abilities, physical performance, and motor performance fitness. Last but not least, the important role of sports activities is to eliminate swimming illiteracy and by means of a special program of medical physical education to influence and mitigate unfitness.<br>In addition to these sports, the Institute offers for those who are interested winter and summer physical education trainings with an attractive program and organises various competitions, either at the premises of the faculty or University or competitions with national or international participation. |       |   |       |       |       |       |       |
| <b>Recommended literature:</b>   |       |   |       |       |       |       |       |
| <b>Course language:</b>  |       |   |       |       |       |       |       |
| <b>Notes:</b>  |       |   |       |       |       |       |       |
| <b>Course assessment</b><br>Total number of assessed students: 11675   |       |   |       |       |       |       |       |
| abs  | abs-A | abs-B                                     | abs-C | abs-D | abs-E | n     | neabs |
| 84.52  | 0.56  | 0.02                                      | 0.0   | 0.0   | 0.05  | 10.63 | 4.22  |

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| <b>Provides:</b> Mgr. Agata Horbacz, PhD., Mgr. Dávid Kaško, PhD., Mgr. Zuzana Küchelová, PhD., doc. PaedDr. Ivan Uher, PhD., prof. RNDr. Stanislav Vokál, DrSc., Mgr. Marcel Čurgali, Mgr. Patrik Berta, Mgr. Ladislav Kručanica, PhD., Bc. Richard Melichar, Mgr. Petra Tomková, PhD. |
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| <b>Date of last modification:</b> 13.05.2021 |
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| <b>Approved:</b> |
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## COURSE INFORMATION LETTER

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| <b>University:</b> P. J. Šafárik University in Košice  |       |  |       |       |       |      |       |
| <b>Faculty:</b> Faculty of Science   |       |  |       |       |       |      |       |
| <b>Course ID:</b> ÚTVŠ/<br>TVc/11  |       | <b>Course name:</b> Sports Activities III. |       |       |       |      |       |
| <b>Course type, scope and the method:</b><br><b>Course type:</b> Practice<br><b>Recommended course-load (hours):</b><br><b>Per week:</b> 2 <b>Per study period:</b> 28<br><b>Course method:</b> combined, present  |       |  |       |       |       |      |       |
| <b>Number of ECTS credits:</b> 2   |       |  |       |       |       |      |       |
| <b>Recommended semester/trimester of the course:</b> 3.  |       |  |       |       |       |      |       |
| <b>Course level:</b> I., I.II., II.  |       |  |       |       |       |      |       |
| <b>Prerequisites:</b>  |       |  |       |       |       |      |       |
| <b>Conditions for course completion:</b><br>min. 80% of active participation in classes  |       |  |       |       |       |      |       |
| <b>Learning outcomes:</b><br>Sports activities in all their forms prepare university students for their professional and personal life. They have a great impact on physical fitness and performance. Specialization in sports activities enables students to strengthen their relationship towards the selected sport in which they also improve.   |       |  |       |       |       |      |       |
| <b>Brief outline of the course:</b><br>Within the optional subject, the Institute of Physical Education and Sports of Pavol Jozef Šafárik University provides for students the following sports activities: aerobics, aikido, basketball, badminton, body form, bouldering, floorball, yoga, power yoga, pilates, swimming, body-building, indoor football, S-M systems, step aerobics, table tennis, tennis, volleyball and chess.<br>In the first two semesters of the first level of education students will master basic characteristics and particularities of individual sports, motor skills, game activities, they will improve level of their physical condition, coordination abilities, physical performance, and motor performance fitness. Last but not least, the important role of sports activities is to eliminate swimming illiteracy and by means of a special program of medical physical education to influence and mitigate unfitness.<br>In addition to these sports, the Institute offers for those who are interested winter and summer physical education trainings with an attractive program and organises various competitions, either at the premises of the faculty or University or competitions with national or international participation. |       |  |       |       |       |      |       |
| <b>Recommended literature:</b>   |       |  |       |       |       |      |       |
| <b>Course language:</b>  |       |  |       |       |       |      |       |
| <b>Notes:</b>  |       |  |       |       |       |      |       |
| <b>Course assessment</b><br>Total number of assessed students: 7873  |       |  |       |       |       |      |       |
| abs  | abs-A | abs-B                                      | abs-C | abs-D | abs-E | n    | neabs |
| 88.8   | 0.05  | 0.01                                       | 0.0   | 0.0   | 0.03  | 4.08 | 7.04  |

**Provides:** Mgr. Marcel Čurgali, Mgr. Agata Horbacz, PhD., Mgr. Dávid Kaško, PhD., Mgr. Zuzana Küchelová, PhD., doc. PaedDr. Ivan Uher, PhD., prof. RNDr. Stanislav Vokál, DrSc., Mgr. Patrik Berta, Mgr. Ladislav Kručanica, PhD., Bc. Richard Melichar, Mgr. Petra Tomková, PhD.

**Date of last modification:** 13.05.2021

**Approved:**

## COURSE INFORMATION LETTER

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| <b>University:</b> P. J. Šafárik University in Košice  |       |   |       |       |       |      |       |
| <b>Faculty:</b> Faculty of Science   |       |   |       |       |       |      |       |
| <b>Course ID:</b> ÚTVŠ/<br>TVd/11  |       | <b>Course name:</b> Sports Activities IV. |       |       |       |      |       |
| <b>Course type, scope and the method:</b><br><b>Course type:</b> Practice<br><b>Recommended course-load (hours):</b><br><b>Per week:</b> 2 <b>Per study period:</b> 28<br><b>Course method:</b> combined, present  |       |   |       |       |       |      |       |
| <b>Number of ECTS credits:</b> 2   |       |   |       |       |       |      |       |
| <b>Recommended semester/trimester of the course:</b> 4.  |       |   |       |       |       |      |       |
| <b>Course level:</b> I., I.II., II.  |       |   |       |       |       |      |       |
| <b>Prerequisites:</b>  |       |   |       |       |       |      |       |
| <b>Conditions for course completion:</b><br>min. 80% of active participation in classes  |       |   |       |       |       |      |       |
| <b>Learning outcomes:</b><br>Sports activities in all their forms prepare university students for their professional and personal life. They have a great impact on physical fitness and performance. Specialization in sports activities enables students to strengthen their relationship towards the selected sport in which they also improve.   |       |   |       |       |       |      |       |
| <b>Brief outline of the course:</b><br>Within the optional subject, the Institute of Physical Education and Sports of Pavol Jozef Šafárik University provides for students the following sports activities: aerobics, aikido, basketball, badminton, body form, bouldering, floorball, yoga, power yoga, pilates, swimming, body-building, indoor football, S-M systems, step aerobics, table tennis, tennis, volleyball and chess.<br>In the first two semesters of the first level of education students will master basic characteristics and particularities of individual sports, motor skills, game activities, they will improve level of their physical condition, coordination abilities, physical performance, and motor performance fitness. Last but not least, the important role of sports activities is to eliminate swimming illiteracy and by means of a special program of medical physical education to influence and mitigate unfitness.<br>In addition to these sports, the Institute offers for those who are interested winter and summer physical education trainings with an attractive program and organises various competitions, either at the premises of the faculty or University or competitions with national or international participation. |       |   |       |       |       |      |       |
| <b>Recommended literature:</b>   |       |   |       |       |       |      |       |
| <b>Course language:</b>  |       |   |       |       |       |      |       |
| <b>Notes:</b>  |       |   |       |       |       |      |       |
| <b>Course assessment</b><br>Total number of assessed students: 5125  |       |   |       |       |       |      |       |
| abs  | abs-A | abs-B                                     | abs-C | abs-D | abs-E | n    | neabs |
| 83.14  | 0.31  | 0.04                                      | 0.0   | 0.0   | 0.0   | 7.75 | 8.76  |

**Provides:** Mgr. Marcel Čurgali, Mgr. Agata Horbacz, PhD., Mgr. Dávid Kaško, PhD., Mgr. Zuzana Küchelová, PhD., doc. PaedDr. Ivan Uher, PhD., prof. RNDr. Stanislav Vokál, DrSc., Mgr. Patrik Berta, Mgr. Ladislav Kručanica, PhD., Bc. Richard Melichar, Mgr. Petra Tomková, PhD.

**Date of last modification:** 13.05.2021

**Approved:**

## COURSE INFORMATION LETTER

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| <b>University:</b> P. J. Šafárik University in Košice  |      |  |     |     |     |
| <b>Faculty:</b> Faculty of Science   |      |  |     |     |     |
| <b>Course ID:</b> ÚMV/<br>SVK/10   |      | <b>Course name:</b> Students scientific conference |     |     |     |
| <b>Course type, scope and the method:</b><br><b>Course type:</b><br><b>Recommended course-load (hours):</b><br><b>Per week: Per study period:</b><br><b>Course method:</b> present |      |  |     |     |     |
| <b>Number of ECTS credits:</b> 4   |      |  |     |     |     |
| <b>Recommended semester/trimester of the course:</b>   |      |  |     |     |     |
| <b>Course level:</b> I., II.   |      |  |     |     |     |
| <b>Prerequisites:</b>  |      |  |     |     |     |
| <b>Conditions for course completion:</b>   |      |  |     |     |     |
| <b>Learning outcomes:</b><br>Individual scientific work of students. Publishing of obtained results in a written form and as a public presentation.                                |      |  |     |     |     |
| <b>Brief outline of the course:</b>  |      |  |     |     |     |
| <b>Recommended literature:</b><br>With respect to the research problematics (article in journals, books).  |      |  |     |     |     |
| <b>Course language:</b><br>Slovak or English   |      |  |     |     |     |
| <b>Notes:</b>  |      |  |     |     |     |
| <b>Course assessment</b><br>Total number of assessed students: 101   |      |  |     |     |     |
| A  | B    | C  | D   | E   | FX  |
| 99.01  | 0.99 | 0.0  | 0.0 | 0.0 | 0.0 |
| <b>Provides:</b>   |      |  |     |     |     |
| <b>Date of last modification:</b> 03.05.2015   |      |  |     |     |     |
| <b>Approved:</b>   |      |  |     |     |     |

## COURSE INFORMATION LETTER

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| <b>University:</b> P. J. Šafárik University in Košice  |   |
| <b>Faculty:</b> Faculty of Science   |   |
| <b>Course ID:</b> ÚTVŠ/<br>LKSp/13   | <b>Course name:</b> Summer Course-Rafting of TISA River |
| <b>Course type, scope and the method:</b><br><b>Course type:</b> Practice<br><b>Recommended course-load (hours):</b><br><b>Per week: Per study period:</b> 36s<br><b>Course method:</b> present  |   |
| <b>Number of ECTS credits:</b> 2   |   |
| <b>Recommended semester/trimester of the course:</b>   |   |
| <b>Course level:</b> I., II.   |   |
| <b>Prerequisites:</b>  |   |
| <b>Conditions for course completion:</b><br>Conditions for course completion:<br>Attendance<br>Final assessment: Raft control on the waterway (attended/not attended)  |   |
| <b>Learning outcomes:</b><br>Learning outcomes:<br>Students have knowledge of rafts (canoe) and their control on waterway.   |   |
| <b>Brief outline of the course:</b><br>Brief outline of the course:<br>1. Assessment of difficulty of waterways<br>2. Safety rules for rafting<br>3. Setting up a crew<br>4. Practical skills training using an empty canoe<br>5. Canoe lifting and carrying<br>6. Putting the canoe in the water without a shore contact<br>7. Getting in the canoe<br>8. Exiting the canoe<br>9. Taking the canoe out of the water<br>10. Steering<br>a) The pry stroke (on fast waterways)<br>b) The draw stroke<br>11. Capsizing<br>12. Commands |   |
| <b>Recommended literature:</b>   |   |
| <b>Course language:</b>  |   |
| <b>Notes:</b>  |   |



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| <b>Course assessment</b>                     |       |
| Total number of assessed students: 153       |       |
| abs  | n     |
| 45.75  | 54.25 |
| <b>Provides:</b> Mgr. Dávid Kaško, PhD.      |       |
| <b>Date of last modification:</b> 18.03.2019 |       |
| <b>Approved:</b>                             |       |

## COURSE INFORMATION LETTER

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| <b>University:</b> P. J. Šafárik University in Košice  |                                     |
| <b>Faculty:</b> Faculty of Science   |                                     |
| <b>Course ID:</b> ÚTVŠ/<br>KP/12   | <b>Course name:</b> Survival Course |
| <b>Course type, scope and the method:</b><br><b>Course type:</b> Practice<br><b>Recommended course-load (hours):</b><br><b>Per week: Per study period:</b> 36s<br><b>Course method:</b> combined, present  |                                     |
| <b>Number of ECTS credits:</b> 2   |                                     |
| <b>Recommended semester/trimester of the course:</b>   |                                     |
| <b>Course level:</b> I., II.   |                                     |
| <b>Prerequisites:</b>  |                                     |
| <b>Conditions for course completion:</b><br>Conditions for course completion:<br>Attendance<br>Final assessment: continuous fulfilment of all tasks within the course  |                                     |
| <b>Learning outcomes:</b><br>Learning outcomes:<br>Students will be familiarized with principles of safe stay and movement in extreme natural conditions as they will obtain theoretical knowledge and practical skills to solve the extraordinary and demanding situations connected with survival and minimization of damage to health. The course develops team work and students will learn how to manage and face the situations that require overcoming of obstacles.  |                                     |
| <b>Brief outline of the course:</b><br>Brief outline of the course:<br>Lectures:<br>1. Principles of behaviour and safety for movement and stay in unknown mountains<br>2. Preparation and leadership of tour<br>3. Objective and subjective danger in mountains<br>4. Principles of hygiene and prevention of damage to health in extreme conditions<br>Exercises:<br>1. Movement in terrain, orientation and navigation in terrain (compasses, GPS)<br>2. Preparation of improvised overnight stay<br>3. Water treatment and food preparation. |                                     |
| <b>Recommended literature:</b>   |                                     |
| <b>Course language:</b>  |                                     |
| <b>Notes:</b>  |                                     |

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| <b>Course assessment</b>   |       |
| Total number of assessed students: 393                                 |       |
| abs  | n     |
| 44.53  | 55.47 |
| <b>Provides:</b> MUDr. Peter Dombrovský, Mgr. Ladislav Kručanica, PhD. |       |
| <b>Date of last modification:</b> 15.03.2019                           |       |
| <b>Approved:</b>   |       |

## COURSE INFORMATION LETTER

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| <b>University:</b> P. J. Šafárik University in Košice  |   |
| <b>Faculty:</b> Faculty of Science   |   |
| <b>Course ID:</b> ÚINF/TYS1/15   | <b>Course name:</b> Typographical systems |
| <b>Course type, scope and the method:</b><br><b>Course type:</b> Practice<br><b>Recommended course-load (hours):</b><br><b>Per week:</b> 2 <b>Per study period:</b> 28<br><b>Course method:</b> present  |   |
| <b>Number of ECTS credits:</b> 2   |   |
| <b>Recommended semester/trimester of the course:</b> 6.  |   |
| <b>Course level:</b> I.  |   |
| <b>Prerequisites:</b>  |   |
| <b>Conditions for course completion:</b>   |   |
| <b>Learning outcomes:</b><br>To provide the basic information on principles for typesetting of documents containing mathematical formulas in Plain TeX, AMS-TeX, and LaTeX.  |   |
| <b>Brief outline of the course:</b><br>Typesetting of a plain text, special text symbols, using of text fonts. TeX macros. Enumerations in text and footnote command. Parameter setting determining the appearance of the pages. Typesetting of mathematical formulas in text and displays, aligning formulas. Definitions of TeX macros. Making tables and pictures. Definitions, theorems, and proofs in a mathematical document. Contents, bibliography, sections in a document.  |   |
| <b>Recommended literature:</b> <ol style="list-style-type: none"> <li>1. D. E. Knuth, The TeXbook, Computers and Typesetting, Addison-Wesley, Reading, Massachusetts, 1986.</li> <li>2. M. Doob, Jemný úvod do TeXu, CSTUG, 1990; český překlad z "A Gentle Introduction to TeX" (text voľne prístupný v CTAN archíve).</li> <li>3. O. Ulrych, AMS-TeX za 59 minút, (verzia 1.0), Praha, 1989.</li> <li>4. J. Chlebíková, AMS-TeX (verzia 2.0), Bratislava, 1992.</li> <li>5. M. Spivak, The Joy of TeX, Amer. Math. Soc., 1986.</li> <li>6. L. Lamport, LaTeX: A Document Preparation System, Addison-Wesley, Massachusetts, 1986.</li> <li>7. L. Lamport, MakeIndex: An index processor for LaTeX, 17 February 1987.</li> <li>8. J. Rybička, LaTeX pro začátečníky, Konvoj, Brno, 1995.</li> <li>9. H. Partl, E. Schlegl, I. Hyna, P. Sýkora, LaTeX – Stručný popis.</li> <li>10. T. Oetiker, H. Partl, I. Hyna, E. Schlegl, M. Kocer, P. Sýkora, Ne příliš stručný úvod do systému LaTeX2e (neboli LaTeX2e v 73 minutách).</li> <li>11. M. Goossens, F. Mittelbach, and A. Samarin, The LaTeX Companion, Addison-Wesley, Reading, Massachusetts, 1994. Kapitola 8 je voľne prístupná v TeX archívoch (ch8.pdf). 4</li> <li>12. G. Grätzer, Math into LaTeX, 3rd edition, Birkhäuser, Boston, 2000.</li> </ol> |   |
| <b>Course language:</b><br>Slovak or english   |   |

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| <b>Notes:</b>                                       |       |       |      |      |     |
| <b>Course assessment</b>                            |       |       |      |      |     |
| Total number of assessed students: 251              |       |       |      |      |     |
| A   | B     | C     | D    | E    | FX  |
| 48.21   | 17.93 | 19.92 | 6.37 | 6.77 | 0.8 |
| <b>Provides:</b> prof. RNDr. Stanislav Krajči, PhD. |       |       |      |      |     |
| <b>Date of last modification:</b> 10.02.2021        |       |       |      |      |     |
| <b>Approved:</b>                                    |       |       |      |      |     |