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University: P. J. Šafá	rik University in Košice					
Faculty: Faculty of Science						
Course ID: CJP/ PFAJAKA/07	Course name: Academic English					
Course type, scope a Course type: Practic Recommended cour Per week: 2 Per stu Course method: pre	nd the method: ce rse-load (hours): dy period: 28 esent					
Number of ECTS cr	edits: 2					
Recommended seme	ster/trimester of the course:					
Course level: I.						
Prerequisities:						
Conditions for cours Active classroom par 1 test (13th week), no Presentation on chose Final evaluation- ave Grading scale: A 93-	ticipation, assignments handed in on time, 2 absences tolerated o retake. en topic rage assessment of test (50%), and presentation (50%). 100%, B 86-92%, C 79-85%, D 72-78%, E 65-71%, FX 64% and less					
Learning outcomes: The development of so of their linguistic cor syntactic aspects, dev for a given purpose, v	students' language skills - reading, writing, listening, speaking, improvement npetence - students acquire knowledge of selected phonological, lexical and relopment of pragmatic competence - students can effectively use the language with focus on Academic English, level B2.					
Brief outline of the c Formal and informal Academic English an Key academic verbs a Linking words in aca Word-formation - aff abstract Selected aspects of E Selected functional a paraphrasing	ourse: English Id its specific features and nouns demic writing, writing a paragraph, word-order, topic sentences ixation nglish pronunciation, academic vocabulary grammar structures - defining, classifying, epressing opinion, cause-effect,					
Recommended litera Seal B.: Academic En T. Armer :Cambridge M. McCarthy M., O' Zemach, D.E, Rumis Olsen, A. : Active Vo www.bbclearningeng Cambridge Academic	ncounters, CUP, 2002 English for Scientists, CUP 2011 Dell F Academic Vocabulary in Use, CUP 2008 ek, L.A: Academic Writing, Macmillan 2005 ocabulary, Pearson, 2013 lish.com c Content Dictionary, CUP, 2009					

r						
Course language:						
English langua	English language, level B2 according to CEFR.					
Notes:	Notes:					
Course assessn	nent					
Total number o	f assessed studen	ts: 416				
А	В	B C D E FX				
36.54	36.54 21.63 15.14 9.38 6.01 11.3					
Provides: Mgr.	Viktória Mária S	lovenská				
Date of last mo	odification: 20.09	0.2023				
Approved: pro	f. RNDr. Gabriel	Semanišin, PhD.	, prof. RNDr. Iv	an Žežula, CSc.		

Faculty: Faculty of Science

Course ID: ÚINF/	Course name: Advanced programming in Python
PPPy/18	

Course type, scope and the method: Course type: Practice Recommended course-load (hours):

Per week: 2 Per study period: 28

Course method: present

Number of ECTS credits: 2

Recommended semester/trimester of the course: 4.

Course level: I., N

Prerequisities: ÚINF/PAZ1a/15

Conditions for course completion:

At least 50 % of the marks in the continuous assessment

A minimum of 50 % marks in the mid-term and end-of-semester practical tests

or

The final project - 100%

Learning outcomes:

Implement solutions to selected problems in Python using available modules. Use and implement non-trivial algorithms to solve selected problems. Use an object-oriented approach to problem solving. Program in Python in an object-oriented manner using Python specifics. Test programs. Implement parallel computing.

Brief outline of the course:

1. Introduction to the environment, basic features of Python, simple and structured data types.

2. Input, output, function definition, lambda function, generator notation, function as parameter, string formatting.

3. Control structures, iterating over data structures, context manager.

4. Exception handling and exception raising. Philosophy of exceptions in Python.

5. Working with files. Serialization and deserialization of data - json and pickle protocol. Text and binary files. Manipulation with files. Open data.

6. Object-oriented programming 1. Design of custom classes, special methods, properties, philosophy of accessing methods and attributes.

7. Object-oriented programming 2. Comparison and differences with Java. Multiple inheritance.

8. Method overloading. Static methods, abstract classes, data class.

9. Decorators, memoization, modules, packages.

10. Code validation (debugging), testing (doctest, unittest), test-driven development.

11. Parallel computing, processes, process triggering and inter-process communication (shared variable, pipe, queue).

12. Graphical program design and implementation.

Recommended literature:

PILGRIM, Mark. Dive into Python 3. 2. United States of America: Apress, 2004. ISBN 978-1430224150. Dostupné také z: https://diveintopython3.net/

SHIPMAN, John W. Tkinter 8.5 reference: a GUI for Python. Socorro, NM 87801: New Mexico Tech Computer Center, 2013. Dostupné také z: https://anzeljg.github.io/rin2/book2/2405/docs/tkinter/tkinter.pdf

LOTT, Steven F. Mastering Object-oriented Python. Birmingham B3 2PB, UK: Packt Publishing, 2014. ISBN 978-1-78328-097-1.

Course language:

Slovak language, knowledge of English language is only required to read documentation of Python.

Notes:

Course assessment

Total number of assessed students: 67

А	В	С	D	Е	FX
7.46	13.43	19.4	19.4	23.88	16.42

Provides: PaedDr. Ján Guniš, PhD., univerzitný docent, doc. RNDr. Ľubomír Šnajder, PhD.

Date of last modification: 10.02.2022

University: P. J	. Šafá	rik Univers	ity in Košice			
Faculty: Facult	y of S	cience				
Course ID: ÚM ALGa/10	[V/	Course name: Algebra I				
Course type, so Course type: Recommended Per week: 3 / 2 Course metho	cope a Lectur d cour 3 Per d: pre	and the met re / Practice rse-load (h study perio	thod: ours): od: 42 / 42			
Number of EC	TS cr	edits: 7				
Recommended	seme	ster/trimes	ster of the cours	e: 1.		
Course level: I.						
Prerequisities:						
Conditions for According to the exam	cours	se completi ults from th	on: e semester and in	n view of the res	ults of the writte	n and oral final
Learning outco To acquire the r theory related to to specific prob	omes: netho o divi lems	ds of mathe sibility, mas and mathen	ematical thinking ster the basic con natical problems.	and cognition. C cepts of linear al	Gain basic knowl Igebra and be abl	edge of number e to apply them
Brief outline of Divisibility in Computing with	the c Z. Fie h mati	e ourse: elds. Syster rices. Deter	ns of linear equ minants, Cramer	ations, Gauss el rule.	imination. Maps	s, permutations.
Recommended T. Katriňák a ko T.S Blyth, E.F. K. Jänich: Line	liter ol.: Al Rober ar alg	ature: lgebra a teo rtson: Basic ebra, Spring	retická aritmetika linear algebra, S ger Verlag, 1991.	a 1, Alfa Bratisla pringer Verlag, 2	.va, 1985. 2001.	
Course langua Slovak	ge:					
Notes:						
Course assessm Total number o	nent f asse	ssed studen	ts: 1414			
А		В	С	D	Е	FX
11.81		11.6	18.67	18.32	28.08	11.53
Provides: prof. Vodička	RND	r. Danica St	tudenovská, CSc.	, RNDr. Lucia Ja	aničková, PhD., I	Mgr. Martin
Date of last mo	difica	tion: 16.04	.2022			
Approved: prot	f. RNI	Dr. Gabriel	Semanišin, PhD.	, prof. RNDr. Iva	an Žežula, CSc.	

University: P. J.	University: P. J. Šafárik University in Košice					
Faculty: Faculty	Faculty: Faculty of Science					
Course ID: ÚM ALG3b/22	V/ Course na	Course name: Algebra II for informaticians				
Course type, sc Course type: I Recommended Per week: 4 / 2 Course method	Course type, scope and the method: Course type: Lecture / Practice Recommended course-load (hours): Per week: 4 / 2 Per study period: 56 / 28 Course method: present					
Number of ECT	FS credits: 7					
Recommended	semester/trime	ster of the cours	e: 2.			
Course level: I.						
Prerequisities:	ÚMV/ALGa/10					
Conditions for Exam	course completi	on:				
Learning outco To provide deep	mes: ber knowledge of	n vector spaces, l	inear transformat	tions and Euclide	an spaces.	
Vector spaces, subspaces. A basis, a dimension and a characterization of n-dimensional vector spaces. The rank of a matrix. Linear transformations and their matrices. Operations with linear transformations, matrices of sums and compositions of linear transformations. Regular linear transformations, regular matrices. Similar matrices. Characteristic vectors and characteristic values of linear transformations. Affine spaces, subspaces and their positions. Euclidean spaces, the distance of subspaces. Conics						
Recommended literature: G. Birkhoff, S. Mac Lane: A Survey of Modern Algebra, New York 1965 T. Katriňák a kol.: Algebra a teoretická aritmetika 1, Alfa Bratislava, 1985 M. Sekanina, L. Boček, M. Kočandrle, J.Šedivý: Geometrie 1, SPN Praha 1986 M. Hejný, V. Zaťko, P. Kršňák: Geometria 1, SPN Bratislava 1985 J. Eliaš, J. Horváth, J. Kajan: Zbierka úloh z vyššej matematiky 1, Alfa Bratislava A. F. Beardon: Algebra and Geometry, Cambridge University Press, 2005						
Course language: Slovak						
Notes:						
Course assessm Total number of	ent assessed studen	its: 340				
А	В	С	D	Е	FX	
15.59	10.0	14.71	18.53	31.76	9.41	
Provides: doc. I	RNDr. Roman So	oták, PhD., Mgr.	Martin Vodička			

Date of last modification: 16.04.2022

University: P. J. Šafá	rik University in Košice					
Faculty: Faculty of Science						
Course ID: ÚINF/ ASU1/15	Course name: Algorithms and data structures					
Course type, scope a Course type: Lectu Recommended cou Per week: 2 / 1 Per Course method: pro	and the method: re / Practice rse-load (hours): study period: 28 / 14 esent					
Number of ECTS cr	redits: 4					
Recommended seme	ester/trimester of the course: 6.					
Course level: I., N						
Prerequisities: ÚINI	F/PAZ1a/15 and ÚINF/PAZ1b/15					
Conditions for cours Practice activities, he Final examination co	se completion: omeworks and midterm exam. onsisting of practice and theoretical test.					
Learning outcomes: Understand and learn algorithms.	algorithmic paradigms and data structures. Analyse time complexity of these					
Brief outline of the of Algorithms' time and Brute Force. Backtr comparison sort algo Data structures – que union & find, trie.	course: d space asymptotic complexity. Main Theorem. Amortized complexity. rack. Divide and Conquer. Dynamic programming. Comparison and non- orithms. Sweep line algorithms. Graph Theory Algorithms. eue, stack, priority queue, heap, prefix sum, binary search trees, interval trees,					
 Recommended literature: 1, Laaksonen A.: Guide to Competitive Programming: Learning and Improving Algorithms Through Contests (Undergraduate Topics in Computer Science), Springer, 2017, ISBN 978-3319725468 2, Forišek M., Steinová M.: Explaining Algorithms Using Metaphors. Springer Briefs in Computer Science, Springer (2013), ISBN 978-1-4471-5018-3 3, R. Sedgewick, K. Wayne: Algorithms (4th Edition), Addison-Wesley Professional, 2011, ISBN 978-0321573513, http://algs4.cs.princeton.edu/home/ 4, Open Data Structures: http://opendatastructures.org/ 						
Course language: Slovak or english						
Notes: Content prerequisitie - programming skills - mathematics: computing with po computing limits o	es: s in some programming language (Python/Java/C++/) olynomials, logarithmic and exponential functions of sequences, L'Hospital rule					

Course assessn Total number o	nent f assessed studen	ts [.] 190				
ABCDEFX						
13.68 4.74 16.84 24.74 36.32 3.68						
Provides: RNDr. Rastislav Krivoš-Belluš, PhD.						
Date of last modification: 08.01.2022						
Approved: prof. RNDr. Gabriel Semanišin, PhD., prof. RNDr. Ivan Žežula, CSc.						

University: P. J. Š	afárik University in Košice
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Faculty: Faculty of Science

Course ID: ÚINF/	Course name: Automata and formal languages
AFJ1a/15	

Course type, scope and the method: Course type: Lecture / Practice

Recommended course-load (hours): Per week: 2 / 1 Per study period: 28 / 14

Course method: present

Number of ECTS credits: 4

Recommended semester/trimester of the course: 4.

Course level: I., N

Prerequisities:

Conditions for course completion:

Oral examination.

Learning outcomes:

To provide theoretical background for studying computer science in general, by giving the necessary knowledge in theory of automata.

Brief outline of the course:

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

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

3: Reduction of automata I: equivalent automata, minimal (optimal) automaton, reachable state, properties of reachable states, elimination of unreachable states

4: Reduction of automata II: equivalent states, k-equivalent states, properties of equivalence and kequivalence, relation between k-equivalence and (k+1)-equivalence, partitioning the state set into equivalence classes, elimination of equivalent states

5: Reduction of automata III: proof of correctness, unambiguity, and optimality of reduced automaton, testing equivalence of two automata

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

7: Operations with regular languages: complement, intersection, union, difference, symmetric difference, testing of emptiness, inclusion, equality, and disjointness for regular languages

8: Nondeterministic finite state acceptors: definition, transition function, language recognized by a nondeterministic acceptor, elimination of nondeterminism

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

11: Regular expressions I: basic properties, transformation of regular expression to an epsilonacceptor

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

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

14: Another operations: homomorphism and inverse homomorphism, a context-free language that is not regular

Recommended literature:

J.E. Hopcroft, R.Motwani, J.D. Ullman: Introduction to automata theory, languages, and computation, Addison-Wesley, 2001.

J. Shallit: A second course in formal languages and automata theory, Cambridge University press, 2009.

M. Sipser: Introduction to the theory of computation, Thomson Course Technology, 2006.

Course language:

Slovak or English

Notes:

Course assessment

Total number of assessed students: 897

А	В	С	D	Е	FX
26.64	18.17	23.41	17.06	9.92	4.79

Provides: prof. RNDr. Viliam Geffert, DrSc., RNDr. Juraj Šebej, PhD.

Date of last modification: 23.11.2021

University: P. J. Šafárik	k University in Košice
Faculty: Faculty of Sci	ence
Course ID: ÚINF/ C AFJ1b/15	Course name: Automata and formal languages
Course type, scope and Course type: Lecture Recommended course Per week: 2 / 1 Per st Course method: prese	d the method: / Practice e-load (hours): rudy period: 28 / 14 ent
Number of ECTS cred	lits: 5
Recommended semest	er/trimester of the course: 5.
Course level: I.	
Prerequisities: ÚINF/A	AFJ1a/15
Conditions for course Test and oral examinati	completion: ion.
Learning outcomes: To provide theoretical b knowledge in theory of	background for studying computer science in general, by giving the necessary f automata.
Brief outline of the cou 1: Pushdown automata by empty pushdown 2: Deterministic pushdo 3: Context-free gramma of type A→epsilon and 4: Relation between co grammar to a pushdown 5: Pumping lemma II: a 7: Closure properties of 8: Closure properties of 9: Pushdown automata practice 10: Context-sensitive Turing machine (LBA) a context-sensitive gram 11: Closure properties of 12: Recursively enund deterministic Turing magrammar, transforming properties 13: Universal Turing magrammar, transforming properties	<pre>urse: : definition of a pushdown automaton, accepting by final states, accepting own automata: examples of application in practice ars: basic definition, leftmost derivation, derivation tree, elimination of rules l A→B, Chomsky normal form ontext-free grammars and pushdown automata: transforming context-free n automaton, transforming pushdown automaton to a context-free grammar tatement of the lemma and its proof applications of the lemma f context-free languages f deterministic context-free languages a producing an output: basic definitions and properties, applications in languages: context-sensitive grammar, nondeterministic linear-bounded b, transforming context-sensitive grammar to an LBA, transforming LBA to mmar of context-sensitive languages merable languages: phrase-structure grammar, nondeterministic and achine, transforming nondeterministic Turing machine to a phrase-structure g phrase-structure grammar to a deterministic Turing machine, closure hachine decidable problems of the formal language theory ure:</pre>

1. J.E. Hopcroft, R.Motwani, J.D. Ullman: Introduction to automata theory, languages, and computation, Addison-Wesley, 2001.

2. J. Shallit: A second course in formal languages and automata theory, Cambridge University press, 2009.

3. M. Sipser: Introduction to the theory of computation, Thomson Course Technology, 2006.

Course language:

Slovak or English

Notes:

Content prerequisities:

 Basic mathematical background (proof by contradicion and by mathematical induction), basic notions from the set theory (union, intersection, complement, cartesian product).
 Basic knowledge about finite state automata and regular languages.

Course assessment

Total number of assessed students: 599

A	В	С	D	Е	FX
38.4	16.86	19.2	17.03	6.01	2.5

Provides: prof. RNDr. Viliam Geffert, DrSc., RNDr. Juraj Šebej, PhD.

Date of last modification: 23.11.2021

University: P. J. Šafa	University: P. J. Šafárik University in Košice					
Faculty: Faculty of S	Faculty: Faculty of Science					
Course ID: ÚINF/ BPOA/22	Course name: Bachelor Thesis and its Defence					
Course type, scope a Course type: Recommended cou Per week: Per stue Course method: pr	and the method: arse-load (hours): dy period: esent					
Number of ECTS ci	redits: 4					
Recommended seme	ester/trimester of the course:					
Course level: I.						
Prerequisities: ÚIN	F/SZPb/22					
	x					

Conditions for course completion:

The bachelor thesis is the result of the student's own work. It must not show elements of academic fraud and must meet the criteria of good research practice defined in the Rector's Decision no. 21/2021, which lays down the rules for assessing plagiarism at Pavol Jozef Šafárik University in Košice and its components. Fulfillment of the criteria is verified mainly in the supervision process and in the process of thesis defense. Failure to do so is reason for disciplinary action.

Learning outcomes:

The bachelor's thesis demonstrates mastery of the basics of theory and professional terminology of the field of study, acquisition of knowledge, skills and competencies in accordance with the declared profile of the graduate of the study program, as well as the ability to apply them creatively in solving selected field problems. The bachelor thesis may have elements of compilation. The student demonstrates the ability of independent professional work in terms of content, formal and ethical. Further details on the bachelor thesis are determined by Directive no. 1/2011 on the basic requirements of final theses and the Study Regulations of UPJŠ in Košice for the 1st, 2nd and combined 1st and 2nd degree.

Brief outline of the course:

- 1. Elaboration of the bachelor thesis in accordance with the instructions of the supervisor.
- 2, Presentation of the results of the bachelor's thesis before the examination commission.
- 3. Answering questions related to the topic of the bachelor thesis within the discussion.

Recommended literature:

The recommended literature is determined individually in accordance with the topic of the bachelor's thesis.

Course language:

Slovak and optionally English.

Notes:

Course assessment					
Total number o	f assessed studen	ts: 0			
А	A B C D E FX				
0.0 0.0 0.0 0.0 0.0 0.0					
Provides:					
Date of last modification: 07.03.2022					
Approved: prot	Approved: prof. RNDr. Gabriel Semanišin, PhD., prof. RNDr. Ivan Žežula, CSc.				

University: P. J. Šafárik University in Košice					
Faculty: Faculty of S	Faculty: Faculty of Science				
Course ID: ÚMV/ BKPa/22	Course ID: ÚMV/ Course name: Bachelor project I 3KPa/22				
Course type, scope and the method: Course type: Practice Recommended course-load (hours): Per week: 1 Per study period: 14 Course method: present					
Number of ECTS cr	edits: 1				
Recommended seme	ster/trimester of the cours	e: 5			
Course level: I.					
Prerequisities:					
Conditions for cours To prepare and prese	Conditions for course completion: To prepare and present a contribution related to thesis and its topic.				
Learning outcomes: 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.					
Brief outline of the course: 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.					
Recommended literature: electronic information sources					
Course language: Slovak and English					
Notes:					
Course assessment Total number of assessed students: 118					
	abs	n			
	100.0 0.0				
Provides: doc. RNDr	Provides: doc. RNDr. Dušan Šveda, CSc.				
Date of last modification: 24.08.2022					
Approved: prof. RNDr. Gabriel Semanišin, PhD., prof. RNDr. Ivan Žežula, CSc.					
·					

University: P. J. Šafá	rik University in Koši	ce		
Faculty: Faculty of S	cience			
Course ID: ÚMV/ Course name: Bachelor project II 3KPb/22				
Course type, scope a Course type: Recommended cour Per week: Per stud Course method: pre	nd the method: rse-load (hours): y period: esent			
Number of ECTS cr	edits: 2			
Recommended seme	ster/trimester of the	course: 6.		
Course level: I.				
Prerequisities:				
Conditions for cours	e completion:			
Learning outcomes:				
Brief outline of the c	ourse:			
Recommended litera	ture:			
Course language:				
Notes:				
Course assessment Total number of asses	ssed students: 101			
	abs	n		
	100.0	0.0		
Provides:				
Date of last modifica	tion: 24.08.2022			
Approved: prof. RNI	Dr. Gabriel Semanišin	, PhD., prof. RNDr. Ivan Žežula, CSc.		

Faculty: Faculty of Science Faculty: Faculty of Science Course ID: ÚMV/ Course name: Bachelor thesis and its defence BPO/14 Course type; Recommended course-load (hours): Per week: Per study period: Course type; Recommended semester/trimester of the course: Course level: I. Prerequisities: Conditions for course completion: The bachelor thesis is the result of the student's own work. It must not show elements of academ fraud and must meet the criteria of good research practice defined in the Rector's Decision n 21/2021, which lays down the rules for assessing plagiarism at Pavol Jozef Safärik University. Košice and its components. Fulfillment of the criteria is verified mainly in the supervision proce and in the process of thesis defense. Failure to do so is reason for disciplinary action. Learning outcomes: Evaluation of student's competences with respect to the profile of the graduate. The bachelor's thesi demonstrates mastery of the basics of theory and professional terminology of the field of stud acquisition of knowledge, skills and competencies in accordance with the declared profile of the dacquister of the student professional work in terms of compilation. The student demonstrat the ability of independent professional work in terms of compilation. The student demonstrat the ability of independent professional work in terms of compilation. The student demonstrat the ability of independent professional work in terms of compilation. Evaluation of t	University. P I Šafá	rik University in Košice
Course ID: ÚMV/ Course name: Bachelor thesis and its defence BPO/14 Course name: Bachelor thesis and its defence BPO/14 Course name: Bachelor thesis and its defence BPO/14 Course type, scope and the method: Course type, scope and the method: Course type: Recommended course-load (hours): Per week: Per study period: Course method: present Number of ECTS credits: 4 Recommended semester/trimester of the course: Course level: 1. Prerequisities: Course the result of the student's own work. It must not show elements of academ fraud and must meet the criteria of good research practice defined in the Rector's Decision n 21/2021, which lays down the rules for assessing plagiarism at Pavol Jozef Šafărik University Košice and its components. Fulfillment of the criteria is verified mainly in the supervision proce and in the process of thesis defense. Failure to do so is reason for disciplinary action. Learning outcomes: Evaluation of student's competences with respect to the profile of the graduate. The bachelor's thesi demonstrates mastery of the basics of theory and professional terminology of the field of stud acquisition of knowledge, skills and competencies in accordance with the declared profile of the graduate of the study rogram, as well as the ability to apply them creatively in solving select field problems. The bachelor thesis may have elements of compilation. The student demonstrat the ability of independent professional work in terms of content, formal and ethical. Further detai on the bachelor thesi	Faculty: Faculty of S	cience
Course type, scope and the method: Course type: Recommended course-load (hours): Per week: Per study period: Course method: present Number of ECTS credits: 4 Recommended semester/trimester of the course: Course level: 1. Prerequisities: Conditions for course completion: The bachelor thesis is the result of the student's own work. It must not show elements of academ fraud and must meet the criteria of good research practice defined in the Rector's Decision n 21/2021, which lays down the rules for assessing plagiarism at Pavol Jozef Šafárik University Košice and its components. Fulfillment of the criteria is verified mainly in the supervision proce and in the process of thesis defense. Failure to do so is reason for disciplinary action. Learning outcomes: Evaluation of student's competences with respect to the profile of the graduate. The bachelor's thes demonstrates mastery of the basics of theory and professional terminology of the field of stud acquisition of knowledge, skills and competencies in accordance with the declared profile of th graduate of the study program, as well as the ability to apply them creatively in solving select field problems. The bachelor thesis may have elements of compilation. The student demonstrat the ability of independent professional work in terms of content, formal and ethical. Further detai on the bachelor thesis are determined by Directive no. 1/2011 on the basic requirements of fin theses and the Study Regulations of UPJS in Košice. Brief outline of the course: 1 1 El	Course ID: ÚMV/ BPO/14	Course name: Bachelor thesis and its defence
Number of ECTS credits: 4 Recommended semester/trimester of the course: Course level: I. Prerequisities: Conditions for course completion: The bachelor thesis is the result of the student's own work. It must not show elements of academ fraud and must meet the criteria of good research practice defined in the Rector's Decision n 21/2021, which lays down the rules for assessing plagiarism at Pavol Jozef Šafärik University Košice and its components. Fulfillment of the criteria is verified mainly in the supervision proce and in the process of thesis defense. Failure to do so is reason for disciplinary action. Learning outcomes: Evaluation of student's competences with respect to the profile of the graduate. The bachelor's thesi demonstrates mastery of the basics of theory and professional terminology of the field of stud acquisition of knowledge, skills and competencies in accordance with the declared profile of the graduate of the study program, as well as the ability to apply them creatively in solving select field problems. The bachelor thesis may have elements of compilation. The student demonstrat the ability of independent professional work in terms of content, formal and ethical. Further detai on the bachelor thesis are determined by Directive no. 1/2011 on the basic requirements of fin theses and the Study Regulations of UPJŠ in Košice. Brief outline of the course: 1 Elaboration of the prosting of the bachelor's thesis before the examination commission. 3. Answering questions related to the topic of the bachelor thesis within the discussion. Recommended literature:	Course type, scope a Course type: Recommended cour Per week: Per stud Course method: pre	nd the method: rse-load (hours): y period: esent
Recommended semester/trimester of the course: Course level: I. Prerequisities: Conditions for course completion: The bachelor thesis is the result of the student's own work. It must not show elements of academ fraud and must meet the criteria of good research practice defined in the Rector's Decision n 21/2021, which lays down the rules for assessing plagiarism at Pavol Jozef Šafárik University Košice and its components. Fulfillment of the criteria is verified mainly in the supervision proce and in the process of thesis defense. Failure to do so is reason for disciplinary action. Learning outcomes: Evaluation of student's competences with respect to the profile of the graduate. The bachelor's thesi demonstrates mastery of the basics of theory and professional terminology of the field of stud acquisition of knowledge, skills and competencies in accordance with the declared profile of th graduate of the study program, as well as the ability to apply them creatively in solving selector field problems. The bachelor thesis may have elements of compilation. The student demonstrat the ability of independent professional work in terms of content, formal and ethical. Further detai on the bachelor thesis are determined by Directive no. 1/2011 on the basic requirements of fin theses and the Study Regulations of UPJŠ in Košice. Brief outline of the course: 1. Elaboration of the bachelor thesis in accordance with the instructions of the supervisor. 2. Presentation of the results of the bachelor's thesis before the examination commission. 3. Answering questions related to the topic of the bachelor thesis within the discussion. Recommended literat	Number of ECTS cr	edits: 4
Course level: I. Prerequisities: Conditions for course completion: The bachelor thesis is the result of the student's own work. It must not show elements of academ fraud and must meet the criteria of good research practice defined in the Rector's Decision n 21/2021, which lays down the rules for assessing plagiarism at Pavol Jozef Šafárik University Košice and its components. Fulfillment of the criteria is verified mainly in the supervision proce and in the process of thesis defense. Failure to do so is reason for disciplinary action. Learning outcomes: Evaluation of student's competences with respect to the profile of the graduate. The bachelor's these demonstrates mastery of the basics of theory and professional terminology of the field of stud acquisition of knowledge, skills and competencies in accordance with the declared profile of th graduate of the study program, as well as the ability to apply them creatively in solving selector field problems. The bachelor thesis may have elements of compilation. The student demonstrat the ability of independent professional work in terms of content, formal and ethical. Further detail on the bachelor thesis are determined by Directive no. 1/2011 on the basic requirements of fint theses and the Study Regulations of UPJŠ in Košice. Brief outline of the course: 1. Elaboration of the results of the bachelor's thesis before the examination commission. 3. Answering questions related to the topic of the bachelor thesis within the discussion. Recommended literature: The recommended literature is determined individually in accordance with the topic of the bachelor's thesis.	Recommended seme	ster/trimester of the course:
 Prerequisities: Conditions for course completion: The bachelor thesis is the result of the student's own work. It must not show elements of academ fraud and must meet the criteria of good research practice defined in the Rector's Decision n 21/2021, which lays down the rules for assessing plagiarism at Pavol Jozef Šafárik University Košice and its components. Fulfillment of the criteria is verified mainly in the supervision proce and in the process of thesis defense. Failure to do so is reason for disciplinary action. Learning outcomes: Evaluation of student's competences with respect to the profile of the graduate. The bachelor's these demonstrates mastery of the basics of theory and professional terminology of the field of stud acquisition of knowledge, skills and competencies in accordance with the declared profile of the graduate of the study program, as well as the ability to apply them creatively in solving select field problems. The bachelor thesis may have elements of compilation. The student demonstrat the ability of independent professional work in terms of content, formal and ethical. Further detaid on the bachelor thesis are determined by Directive no. 1/2011 on the basic requirements of fint theses and the Study Regulations of UPJŠ in Košice. Brief outline of the course: 1. Elaboration of the bachelor thesis in accordance with the instructions of the supervisor. 2. Presentation of the esults of the bachelor's thesis before the examination commission. 3. Answering questions related to the topic of the bachelor thesis within the discussion. 	Course level: I.	
 Conditions for course completion: The bachelor thesis is the result of the student's own work. It must not show elements of academ fraud and must meet the criteria of good research practice defined in the Rector's Decision n 21/2021, which lays down the rules for assessing plagiarism at Pavol Jozef Šafărik University Košice and its components. Fulfillment of the criteria is verified mainly in the supervision proce and in the process of thesis defense. Failure to do so is reason for disciplinary action. Learning outcomes: Evaluation of student's competences with respect to the profile of the graduate. The bachelor's these demonstrates mastery of the basics of theory and professional terminology of the field of stud acquisition of knowledge, skills and competencies in accordance with the declared profile of th graduate of the study program, as well as the ability to apply them creatively in solving selecte field problems. The bachelor thesis may have elements of compilation. The student demonstrat the ability of independent professional work in terms of content, formal and ethical. Further detail on the bachelor thesis are determined by Directive no. 1/2011 on the basic requirements of fin theses and the Study Regulations of UPJŠ in Košice. Brief outline of the course: Elaboration of the bachelor thesis in accordance with the instructions of the supervisor. Presentation of the study of the bachelor's thesis before the examination commission. Answering questions related to the topic of the bachelor thesis within the discussion. 	Prerequisities:	
Learning outcomes: Evaluation of student's competences with respect to the profile of the graduate. The bachelor's thes demonstrates mastery of the basics of theory and professional terminology of the field of stud acquisition of knowledge, skills and competencies in accordance with the declared profile of th graduate of the study program, as well as the ability to apply them creatively in solving selects field problems. The bachelor thesis may have elements of compilation. The student demonstrat the ability of independent professional work in terms of content, formal and ethical. Further detail on the bachelor thesis are determined by Directive no. 1/2011 on the basic requirements of fin theses and the Study Regulations of UPJŠ in Košice. Brief outline of the course: 1. Elaboration of the bachelor thesis in accordance with the instructions of the supervisor. 2. Presentation of the results of the bachelor's thesis before the examination commission. 3. Answering questions related to the topic of the bachelor thesis within the discussion. Recommended literature: The recommended literature is determined individually in accordance with the topic of the bachelor's thesis.	Conditions for cours The bachelor thesis is fraud and must meet 21/2021, which lays Košice and its compo and in the process of	e completion: s the result of the student's own work. It must not show elements of academic the criteria of good research practice defined in the Rector's Decision no. down the rules for assessing plagiarism at Pavol Jozef Šafárik University in ments. Fulfillment of the criteria is verified mainly in the supervision process thesis defense. Failure to do so is reason for disciplinary action.
 Brief outline of the course: Elaboration of the bachelor thesis in accordance with the instructions of the supervisor. Presentation of the results of the bachelor's thesis before the examination commission. Answering questions related to the topic of the bachelor thesis within the discussion. Recommended literature: The recommended literature is determined individually in accordance with the topic of the bachelor's thesis.	Learning outcomes: Evaluation of student demonstrates mastery acquisition of knowle graduate of the study field problems. The b the ability of indepen on the bachelor thesi theses and the Study	's competences with respect to the profile of the graduate. The bachelor's thesis y of the basics of theory and professional terminology of the field of study, edge, skills and competencies in accordance with the declared profile of the program, as well as the ability to apply them creatively in solving selected bachelor thesis may have elements of compilation. The student demonstrates dent professional work in terms of content, formal and ethical. Further details s are determined by Directive no. 1/2011 on the basic requirements of final Regulations of UPJŠ in Košice.
Recommended literature: The recommended literature is determined individually in accordance with the topic of the bachelor's thesis.	Brief outline of the c 1. Elaboration of the 2. Presentation of the 3. Answering question	ourse: bachelor thesis in accordance with the instructions of the supervisor. results of the bachelor's thesis before the examination commission. ns related to the topic of the bachelor thesis within the discussion.
	Recommended litera The recommended literates bachelor's thesis.	ture: terature is determined individually in accordance with the topic of the
Slovak	Course language: Slovak	
Notes:	Notes:	

Course assessment						
Total number o	f assessed studen	ts: 187				
А	A B C D E FX					
67.91 17.65 7.49 3.74 2.14 1.07						
Provides:						
Date of last modification: 19.04.2022						
Approved: prof. RNDr. Gabriel Semanišin, PhD., prof. RNDr. Ivan Žežula, CSc.						

University: P. J. Šafárik University in Košice							
Faculty: Facult	y of Science						
Course ID: CJF PFAJKKA/07	P/ Course name: Communicative Competence in English						
Course type, scope and the method: Course type: Practice Recommended course-load (hours): Per week: 2 Per study period: 28 Course method: present							
Number of EC	Number of ECTS credits: 2						
Recommended	semester/trimes	ster of the cours	e:				
Course level: I.							
Prerequisities:							
Conditions for Active participa two classes at th 2 credit tests (p Final evaluation Final grade will FX 64 % and lee Learning outco Brief outline of Recommended www.bbclearnin Štěpánek, Libon 2011. McCarthy M., O Fictumova J., O	course completi ation in class and he most. resumably in we he consists of the size calculated as be calculated as ess. omes: The course: literature: ngenglish.com r a kol. Academic O'Dell F.: English Seccarelli J., Long	ion: I completed hom eks 6/7 and 12/13 scores obtained f follows: A 93-10 c English-Akaden n Vocabulary in U g T.: Angličtina,	ework assignmer 3) and an oral pre for the 2 tests (50% 0 %, B 86-92%, C mická angličtina. Jse, Upper-Interr konverzace pro p	nts. Students are esentation in Eng %) and the presen C 79-85%, D 72-7 Praha: Grada Pu nediate. CUP, 19 pokročilé. Barrist	allowed to miss lish. ntation (50%). 78%, E 65-71%, ublishing, a.s., 94. er and		
Principal, 2008. Peters S. Gráf T : Time to practise. Polyglot, 2007							
Jones L.: Communicative Grammar Practice. CUP, 1985. Additional study materials.							
Course language: English language, B2-C1 level according to CEFR							
Notes:							
Course assessm Total number of	nent f assessed studen	its: 299					
А	В	С	D	Е	FX		
45.48	20.74	17.39	7.69	6.02	2.68		
Provides: Mgr.	Ivana Kupková,	PhD.					

Date of last modification: 11.02.2024

University: P. J. Šafá	rik University in Košice					
Faculty: Faculty of S	cience					
Course ID: CJP/ PFAJGA/07	Course name: Communicative Grammar in English					
Course type, scope a Course type: Practic Recommended cou Per week: 2 Per stu Course method: pre	nd the method: ce rse-load (hours): idy period: 28 esent					
Number of ECTS cr	Number of ECTS credits: 2					
Recommended seme	ster/trimester of the course:					
Course level: I.						
Prerequisities:						
Conditions for course Active classroom part by given deadlines. Powerpoint presentat Final Test - end of se Final assessment = ar Grading scale: A 93-	ticipation (maximum 2 absences tolerated), homework assignments completed ion of a topic related to the study field. mester, no retake verage of test and presentation. 100%, B 86-92%, C 79-85%, D 72-78%, E 65-71%, FX 64% and less					
Learning outcomes: The development of a of their communic phonological, lexical efectively use the lar level B2.	students' language skills - reading, writing, listening, speaking, improvement ative linguistic competence. Students acquire knowledge of selected and syntactic aspects, development of pragmatic competence. Students can iguage for a given purpose, with focus on Academic English and English on					
Brief outline of the c Selected aspects of E Word formation Contrast of tenses in The passive voice Types of Conditional Phrasal verbs and En Words order and coll	ourse: nglish grammar and pronunciation English s glish idioms ocations, prepositional phrases					
Recommended litera Vince M.: Macmillar McCarthy, O'Dell: En www.linguahouse.co esllibrary.com bbclearningenglish.co ted.com/talks Course language:	n ture: n Grammar in Context, Macmillan, 2008 nglish Vocabulary in Use, CUP, 1994 m					

English languag	ge, level B2 acco	rding to CEFR.			
Notes:					
Course assessm Total number o	nent f assessed studen	ts: 446			
А	В	С	D	Е	FX
41.48	19.51	15.7	7.85	5.61	9.87
Provides: Mgr.	Lenka Klimčáko	vá			
Date of last mo	dification: 20.09	0.2023			
Approved: prof	f. RNDr. Gabriel	Semanišin, PhD	., prof. RNDr. Iv	an Žežula, CSc.	

University: P. J. Šafár	rik University in Košice		
Faculty: Faculty of So	cience		
Course ID: KGER/ Course name: Communicative Grammar in German Language NJKG/07			
Course type, scope an Course type: Practic Recommended cour Per week: 2 Per stue Course method: pre	nd the method: ce rse-load (hours): dy period: 28 esent		

Recommended semester/trimester of the course:

Course level: I.

Prerequisities:

Conditions for course completion:

Active participation in class and completed homework assignments. Students are allowed to miss 2 classes at the most (2x90 min.). 2 control tests during the semester. 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.

Learning outcomes:

The aim of the course is to identify and eliminate the most frequent grammatical errors in oral and written communication, learning language skills of listening comprehension, speaking, reading and writing, increasing students 'language competence (acquisition of selected phonological, lexical and syntactic knowledge), development of students' pragmatic competence (acquisition of the ability to express selected language functions), development of presentation skills, etc.

Brief outline of the course:

The course is aimed at practicing and consolidating knowledge of morphology and syntax of German in order to show the context in grammar as a whole. The course is intended for students who often make grammatical errors in oral as well as written communication. Through the analysis of texts, audio recordings, tests, grammar exercises, monologic and dialogical expressions of students focused on specific grammatical structures, problematic cases are solved individually and in groups. Emphasis is placed on the balanced development of grammatical thinking in the communication process, which ultimately contributes to the development of all four language skills.

Recommended literature:

Dreyer, H. – Schmitt, R.: Lehr- und Übungsbuch der deutschen Grammatik. Hueber Verlag GmbH & Co. Ismaning, 2009.

Krüger, M.: Motive Kursbuch, Lektion 1 – 30. Huebert Verlag GmbH & Co. Ismaning, 2020. Brill, L.M. – Techmer, M.: Deutsch. Großes Übungsbuch. Wortschatz. Huebert Verlag GmbH & Co. Ismaning, 2011.

Földeak, Hans: Sag's besser!. Grammatik. Arbeitsbuch für Fortgeschrittene. Huebert Verlag GmbH & Co. Ismaning, 2001.

Geiger, S. – Dinsel, S.: Deutsch Übungsbuch Grammatik A2-B2. Huebert Verlag GmbH & Co. Ismaning, 2018.

Dittelová, E. – Zavatčanová, M.: Einführung in das Studium der deutschen Fachsprache. Košice: ES UPJŠ, 2000.

Course langua German, Slova	ge: k language				
Notes:					
Course assess Total number of	nent of assessed studen	ts: 57			
А	В	С	D	E	FX
61.4	10.53	8.77	3.51	8.77	7.02
Provides: Mgr.	Ulrika Strömplov	vá, PhD.	1		
Date of last me	odification: 12.07	2.2022			
Approved: pro	f. RNDr. Gabriel	Semanišin, PhD	., prof. RNDr. Iv	an Žežula, CSc.	

University: P. J. Šafárik University in Košice					
Faculty: Faculty of S	cience				
Course ID: ÚINF/ VKN1/22	Course name: Computational and cognitive neuroscience I				
Course type, scope a Course type: Lectur Recommended cour Per week: 2 / 2 Per Course method: pre	nd the method: re / Practice rse-load (hours): study period: 28 / 28 esent				
Number of ECTS cr	edits: 5				
Recommended seme	ster/trimester of the course: 3., 5.				
Course level: I., N					
Prerequisities:					
Conditions for cours Midterm exam Final exam consisting	g of written and/or oral part				
Learning outcomes: Overview anatomy, computational aspect	physiology, and cognitive processes in the human brain with focus on s of cognition and computational tools used in neuroscience.				
 Brief outline of the c 1. Intro to neural and 2. Overview of anato 3. Methods of study i 4. Neuron: anatomy, 5. Propagation of sign 6. Synaptic transmiss 7. Psychology of men 8. Vision: Intro. Percesitance. 9. Hearing and audito 10. Language, psycho 11. Attention. 12. Crossmodal intera 13. Reasoning and de 	ourse: cognitive science my and physiology of the central nervous system (CNS) n neuroscience. Sensory, motor and associative brain areas. types, action potential nals in the neuron, neural coding. ion and plasticity - neural basis of learning and memory. nory and learning. eeption of brightness, edges, color. Model BCS/FCS. Perception of size and ory cognition. olinguistics, speech perception and production. action (vision, hearing, touch). ecision making.				
Recommended litera 1. Poeppel D., Mangu 2020. ISBN-13: 978- 2. Dayan P and LF A Modeling of Neural S 3. Thagard P: Mind: [†] 978-0262701099	ture: In G., Gazzaniga M. (ed.): The Cognitive Neurosciences. 6th ed. MIT Press. 0262043250 bbott: Theoretical Neuroscience - Computational and Mathematical Systems. MIT Press, 2005 ISBN-13: 978-0262541855 Introduction to Cognitive Science, 2nd Edition. Bradford Books. ISBN-131:				

Course language:

Slovak or Engl	ish				
Notes: Content prereq Algebra, progr	uisites: amming (Matlab)				
Course assessm Total number of	nent of assessed studen	ts: 31			
А	В	С	D	Е	FX
25.81	19.35	25.81	22.58	3.23	3.23
Provides: doc. Doreswamy	Ing. Norbert Kop	čo, PhD., Ing. Pe	ter Lokša, PhD.,	RNDr. Keerthi I	Kumar
Date of last mo	odification: 14.02	2.2022			
Approved: pro	f. RNDr. Gabriel	Semanišin, PhD.	, prof. RNDr. Iva	an Žežula, CSc.	

	COURSE INFORMATION LETTER					
University: P. J. Šafá	árik University in Košice					
Faculty: Faculty of S	Faculty: Faculty of Science					
Course ID: ÚINF/ PSIN/15	Course name: Computer network Internet					
Course type, scope a Course type: Lectu Recommended cou Per week: 3 / 1 Per Course method: pre	and the method: re / Practice irse-load (hours): study period: 42 / 14 esent					
Number of ECTS cr	cedits: 5					
Recommended seme	ester/trimester of the course: 4., 6.					
Course level: I., N						
Prerequisities: ÚINE	F/PAZ1a/15 or ÚINF/PRG1/15					
Conditions for cours Activity at excercises Verbal exam (min 25	se completion: s (max 18 points), home work (max 18 points), test (max 30 points). points, max 50 points). Required minimum for passing the course is 55 points.					
Learning outcomes: Students will get the the principles of ISO/ the meaning and usa communication chan They will understand principle of routing p acknowledged TCP t interface of UDP and protocols of the Inter	informations about principles and achitecture of Internet. They will understand /OSI layers reference model for network communication. They will understand age of terms protocol, service, interface. They will analyze the parameters of unels, understand the function of interconnection devices (hub, switch, router). d the structure of IP packets, addressing and how packets are transmitted, the protocols and the creation of routing tables. They will understand the priciples of transport transmission and its implementation. They will know how to use the d TCP protocols in a program code. They will understand the basic application rnet.					
 Brief outline of the of 1. Introduction to connetworks, ISO OSI r Application layer: Application layer: Application layer Transport layer: Transport layer: Network Layer: 	 course: mputer networks, internet connection types, delay and loss in packet-switched eference model and TCP/IP protocols family. Web and HTTP, protocol FTP ,e-mail and protocols SMTP, POP3, IMAP, c domain names and DNS, Peer-to-peer applications. Security in computer ervices, multiplexing and demultiplexing, protocol UDP, reliable data transfer onnection oriented transport protocol TCP, flow and congestion control. 					

9. Link layer: error detection, multiple access methods CSMA/CD and CSMA/CA, Ethernet, frames, protocols ARP and RARP, link layer addressing

10. Link Layer and wireless and mobile networks: hub, switch, virtual LAN, 802.11 Wireless LAN, Bluetooth 802.15, WiMAX 802.16, Mobile IP, mobility in GSM

11. Physical Layer: Communication channels parameters, digital and analog encoding.

Recommended literature:

- 1. J. F. Kurose, Keith W. Ross: Computer Networking: A Top-Down Approach, 7. edition, 2016
- 2. A. S. Tanenbaum: Computer Networks, 5. edition, Pearson, 2010
- 3. W. Stallings: Local and Metropolitan Area Networks, Prentice Hall, 2000
- 4. E. Comer, R.E. Droms: Computer Networks and Internets, Prentice Hall, 2003
- 5. W. R. Stevens: TCP/IP Illustrated, Vol.1: The Protocols, Addison-Wesley, 1994

Course language:

Slovak or English

Notes:

Content prerequisities: basic programming skills in Java

Course assessment

Total number of assessed students: 286

А	В	С	D	Е	FX
10.84	8.74	19.58	18.88	30.07	11.89

Provides: RNDr. Peter Gurský, PhD., doc. RNDr. JUDr. Pavol Sokol, PhD.

Date of last modification: 04.01.2022

University: P. J. Šafái	rik University in Košice					
Faculty: Faculty of S	Faculty: Faculty of Science					
Course ID: ÚMV/ KOP/10	Course name: Convex programming					
Course type, scope a Course type: Lectur Recommended cour Per week: 3 / 1 Per Course method: pre	nd the method: re / Practice rse-load (hours): study period: 42 / 14 esent					
Number of ECTS cro	edits: 5					
Recommended semes	ster/trimester of the course: 6.					
Course level: I., II.						
Prerequisities: ÚMV	/LCO/10 and (ÚMV/MAN1c/22 or ÚMV/MAN2d/22 or ÚMV/FRPb/19)					
Conditions for cours To complete the cou theorems from the lea problems of convex r The overall evaluation the completion of two of 25 points can be of theoretical nature, with more than half of the whereby evaluation E is given in the case of 80-89 a	e completion: rse, it is necessary to demonstrate the ability to formulate definitions and ctured material, to demonstrate the proofs of theorems and to solve selected esp. nonlinear programming. n of the course is awarded on the basis of semester evaluation (which includes o semester tests focusing on problem solving; for each of them, a maximum obtained) and the results of an oral exam (consisting of three questions of a th a total of 50 points). To pass the exam, it is necessary to obtain e maximum number of 100 points (otherwise the test is evaluated by FX), in case of point gain 51-59, D in case of 60-69, C in case of 70-79, B nd A in the case of more than 90 points.					

After completing the course, the student is acquainted with the basics of nonlinear programming from both theoretical point of view (the topics include properties of convex sets, properties of convex functions, optimality conditions for nonlinear problems, Karush-Kuhn-Tucker theory, quadratic programming), as well as from practical one (illustrations of real problems with underlying models that use nonlinear programming, and methods of their solution using computer algebra systems and computer technology).

Brief outline of the course:

Week 1: Practical problems leading to nonlinear programs.

Week 2 - 3: Convex sets and their properties.

Week 4 - 6: Convex functions – properties and criteria of convexity.

Week 7 - 8: Necessary and sufficient conditions of optimality. Karush-Kuhn-Tucker conditions.

Week 9 - 10: Quadratic programming. Duality in nonlinear programming.

Recommended literature:

M. Hamala, M. Trnovská: Nelineárne programovanie, Epos, 2012

M.S. Bazaraa, H.D. Sherali, C.M. Shetty: Nonlinear Programming: Theory and Algorithms, 3rd edition, Wiley-Interscience, 2006

Course language:

Slovak or English

Notes:

Knowledge of the basics of differential calculus of functions of one and more variables, linear algebra and linear programming (simplex method) is required.

Course assessment

Total number of assessed students: 92

А	В	С	D	Е	FX
15.22	14.13	9.78	13.04	47.83	0.0
Provides: prof.	RNDr. Tomáš M	adaras, PhD., RN	NDr. Alfréd Onde	erko, PhD.	

Date of last modification: 19.04.2022

University: P. J. Šafá	irik University in Košice
Faculty: Faculty of S	Science
Course ID: ÚMV/ ADA/19	Course name: Data analysis
Course type, scope a Course type: Lectu Recommended cou Per week: 1 / 3 Per Course method: pr	and the method: re / Practice irse-load (hours): study period: 14 / 42 esent
Number of ECTS cr	·edits: 4
Recommended seme	ester/trimester of the course: 2.
Course level: I.	
Prerequisities: ÚMV	//UAD/10
Conditions for cour Test (30p) and indivi- Oral presentation of At least 50% must be Final evaluation: ≥90	se completion: Idual project work (20p). the individual project work (5p). e obtained from each part. 0% A; ≥80% B; ≥70% C; ≥60% D; ≥50% E; <50% FX.
Learning outcomes: Students will gain pr real data using statist statistical concepts an	actical skills in applying basic statistical methods of estimating and testing on tical software. At the same time, they will develop a concrete idea of the basic nd methods discussed from a theoretical point of view in the following subjects.
Brief outline of the 1. Data visualization 2. Basic principles testing of normality. 3. Confidence interv 4. Confidence interv 5. Testing hypothese 6. Testing hypothese 7. Relationships betv 8. Data visualization 9. Relationships betv 10. Analysis of varia 11. Data visualization 12. Nonparametric n	course: using statistical software R. of statistical inference. Random sample from normal distribution, q-q plot, als for proportions. als for means. s about proportions. s about means. veen quantitative variables. Linear regression, multiple regression. using Python (part I). veen qualitative variables. Goodness-of-Fit tests and contingency tables. ince (principle, testing, graphical representation). n using Python (part II).
Recommended liter 1. Utts, J.M., Heckar 2. Peck, R., Short, T. 3. Crawley, M.J. (20) 4. Wickham, H. (201) 5. VanderPlas, J. (20)	ature: rd, R.F. (2021), Mind od Statistics, 6th ed., Thomson Brooks/Cole (2019), Statistics: Learning from Data, 2nd ed., Cengage Learning 05), Statistics: An Introdution using R, New York: Wiley 6), ggplot2: Elegant Graphics for Data Analysis, 2nd ed. Springer 17), Python Data Science Handbook, O'Reilly Media

Course languag Slovak	ge:				
Notes:					
Course assessm Total number o	nent f assessed studen	ts: 60			
А	В	С	D	Е	FX
66.67	18.33 11.67 1.67 1.67 0.0				
Provides: doc.	RNDr. Martina H	lančová, PhD., R	NDr. Andrej Gaj	doš, PhD.	
Date of last mo	dification: 14.04	.2022			
Approved: prof	f. RNDr. Gabriel	Semanišin, PhD.	, prof. RNDr. Iva	n Žežula, CSc.	

University: P. J. Šafá	rik University in Košice					
Faculty: Faculty of S	cience					
Course ID: ÚINF/ PDA/19	Purse ID: ÚINF/ Course name: Data analysis project I PA/19					
Course type, scope a Course type: Practic Recommended cour Per week: 4 Per stu Course method: pre	nd the method: ce rse-load (hours): dy period: 56 esent					
Number of ECTS cr	edits: 4					
Recommended seme	ster/trimester of the course: 4.					
Course level: I.						
Prerequisities:						
Conditions for cours Active presentation of results from publis	e completion: of the results of the data analysis project and the bachelor thesis. Presentation shed foreign papers.					
Learning outcomes: Knowledge and skills tasks. Knowledge of s intelligence. Develop its interpretation.	s associated with the phases of data analysis and their use in solving specific selected procedures in the field of data analysis, machine learning and artificial oment of understanding of professional text in the field of data analysis and					
Brief outline of the c 1 2. Phases of data data analysis projects projects and bachelor	ourse: analysis projects and selected basic terms 3 4. Selection and specification of 5 7. Selected methods of data analysis 8 11. Consultations on data analysis theses 12 13 Applications of data analysis methods in various fields					
Recommended litera 1. AGGARWAL, Cha 978-3-319-14141-1. 2 Massachusetts: MIT Vahid. Python Machi learn, and TensorFlow WITTEN, I. H., Eibe and techniques. 4th e management systems	Ature: aru C. Data mining: a textbook. Cham: Springer, 2015. ISBN 2. ALPAYDIN, Ethem. Introduction to machine learning. 3rd ed. Press, 2014. ISBN 978-0-262-02818-9. 3. RASCHKA, Sebastian, Mirjalili, ne Learning: Machine Learning and Deep Learning with Python, scikit- w 2, 3rd Edition, Packt Publishing Ltd., 2019. ISBN 978-1789955750. 4. FRANK a Mark A. HALL. Data mining: practical machine learning tools d. Amsterdam: Morgan Kaufmann, 2017. Morgan Kaufman series in data 5. ISBN 9780128042915. 5. Literature associated with particular project.					
Course language: Slovak or English						
Course assessn	nent f assessed studen	ts: 21				
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A	B	С	D	Е	FX	
95.24	0.0	0.0	0.0	4.76	0.0	
Provides: doc. RNDr. Ľubomír Antoni, PhD.						
Date of last modification: 25.01.2022						
Approved: prof. RNDr. Gabriel Semanišin, PhD., prof. RNDr. Ivan Žežula, CSc.						

University: P J Šafá	rik University in Košice
Faculty: Faculty of S	cience
Course ID: ÚINF/ DBS/15	Course name: Database systems for Mathematicians
Course type, scope a Course type: Lectur Recommended cour Per week: 3 / 2 Per Course method: pre	nd the method: re / Practice rse-load (hours): study period: 42 / 28 esent
Number of ECTS cr	edits: 6
Recommended seme	ster/trimester of the course: 3.
Course level: I., II.	
Prerequisities:	
Conditions for cours Demonstration of add evaluation, the ability project. Written works during Written and oral exar	e completion: equate mastery of the content standard of the subject in the ongoing and final y to formulate a problem in the acquired terminology and solve it within a the semester, project. n.
Learning outcomes: After completing the apply standard data n	course, the student acquires the principles of relational databases, is able to nodels, design relational databases and formulate filtering queries.
Brief outline of the c 1) Relational databas 2) Data types, operate 3) JOIN operations; V 4) AGGREGATION 5) Data and database 6) DB design, ER dia 7) System commands 8) Nested queries. RC 9) Three-valued logic 10) Data science and 11) Data warehouses 12) Relational algebr	ourse: es. Query language SQL, filtering; Stored procedures. ors, numerical, string and time functions; System and user functions. Views. CTE. AND GROUP BY; Recursion and transitive closure. models. Relational scheme. RDB principles. Data integrity; Transactions. grams; Triggers and integrity. about DB and tables. Cascading deletion and update; Cursors. DLLUP. CASE expression; Physical organization of data. c. Quantifiers and NOT. Set operations; B-trees and indexes. knowledge acquisition using R; Functional dependencies. Data cube. Pivot table. a. Normalization of relational databases; The latest normal form - ETNF.
Recommended litera - C.J. Date, Database 978-1-449-32801-6 - J. Murach, Murach' 1943872368 - R. Ramakrishnan, J 9780071231510 - S. Krajčí: Databázo	nture: Design and Relational Theory, 2012, O'Reilly Media, Inc., ISBN: s MySQL, 3rd Edition, 2019, Mike Murach & Associates, Inc., ISBN-10: . Gehrke, Database Management Systems, 2020, McGraw-Hill, ISBN13 vé systémy, UPJŠ, 2005

- I. Ben-Gan, D. Sarka, A. Machanic, K. Farlee, T-SQL Querying, 2015, Microsoft Press, ISBN: 978-0-7356-8504-8 - I. Ben-Gan, T-SQL Fundamentals, Third Edition, 2016, Microsoft Press, ISBN:

978-1-5093-02	00-0					
Course langua Slovak or Engl	ge: ish					
Notes:						
Course assess Total number of	nent of assessed studen	ts: 736				
А	В	С	D	Е	FX	
12.91	12.91 10.05 13.86 20.24 32.88 10.05					
Provides: doc.	RNDr. Csaba Tör	rök, CSc., RNDr.	Lukáš Miňo, Ph	D.	<u>.</u>	
Date of last mo	odification: 08.01	.2022				
Approved: pro	f. RNDr. Gabriel	Semanišin, PhD.	., prof. RNDr. Iv:	an Žežula, CSc.		

University: P I Šafá	rik University in Košice
Faculty: Faculty of S	cience
Course ID: ÚMV/ RPR/22	Course name: Decision processes
Course type, scope a Course type: Lectur Recommended cou Per week: 2 / 2 Per Course method: pre	nd the method: re / Practice rse-load (hours): study period: 28 / 28 esent
Number of ECTS cr	edits: 5
Recommended seme	ster/trimester of the course: 6.
Course level: I., II.	
Prerequisities:	
Conditions for cours The evaluation is give within the subject.	en on the basis of elaboration of individual projects related to the topics covered
After completing th (games against nature with advanced topics integrals).	e course, the student has the knowledge on basics of decision theory e), selected methods of solving multicriterial optimization problems together s in decision-making theory (use of non-additive measures and generalized
Brief outline of the c Weeks 1 -2: Basics decision criteria. Week 3: Decision tre Weeks 4 - 8: Multicr the importance of va variants. Week 9: Utility funct Weeks 10 - 11: Non-a making process, othe Week 12: CEU, RDE paradox).	ourse: of decision theory, games against nature: examples of practical problems, es and their applications. iterial optimization: examples of practical problems, methods for evaluating riant assessment criteria, methods for determining compromise and optimal ion, decision-making under risk and uncertainty. dditive measures, their interpretation and the Choquet integral in the decision- r selected non-additive methods. EU method and the Choquet-Stieltjes integral, paradoxes (Allais and Ellsberg
Recommended litera Grabisch, M.: Set Fu Library C~46, Spring Greco, S., Ehrgott, M Surveys, Internationa ed. 2016.	Ature: Inctions, Games and Capacities in Decision Making. Theory and Decision ger International Publishing Switzerland, 2016. I., Figueira, JR.: Multiple Criteria Decision Analysis: State of the Art Il Series in Operations Research & Management Science, 233, Springer; 2nd

Course language:

Slovak

Course assessn	nent						
Total number o	f assessed studen	ts: 8					
А	A B C D E FX						
62.5 12.5 0.0 12.5 12.5 0.0							
Provides: prof. RNDr. Tomáš Madaras, PhD., RNDr. Lenka Halčinová, PhD.							
Date of last modification: 19.04.2022							
Approved: pro:	Approved: prof. RNDr. Gabriel Semanišin, PhD., prof. RNDr. Ivan Žežula, CSc.						

University: P. J. Šafá	rik University in Košice					
Faculty: Faculty of Science						
Course ID: ÚMV/ DSMa/10	Course name: Discrete mathematics I					
Course type, scope a Course type: Lectur Recommended cour Per week: 2 / 2 Per Course method: pre	nd the method: e / Practice rse-load (hours): study period: 28 / 28 esent					
Number of ECTS cr	edits: 5					
Recommended seme	ster/trimester of the course: 3.					
Course level: I.						
Prerequisities:						
Conditions for cours Examination.	e completion:					
Learning outcomes: To be familiar with se appreciate mathemati just standard recipes,	ome factual knowledge of combinatorics and graph theory. To understand an ical notions, definitions, and proofs, to solve problems requiring more than and to express mathematical thoughts precisely and more rigorously.					
Brief outline of the c Basic principles. Counting and binomi Recurrence: Some m miscellaneous metho The inclusion-exclusi Introduction to graphs Planarity. Polyhedra. Traveling round a gra Partitions and colour	ourse: al coefficients, Binomial theorem, polynomial theorem. iscellaneous problems, Fibonacci-type relations, Using generating functions, ds. on principle. Rook polynomials. s: The concept of graphs, paths in graphs. Connectivity. Trees, bipartite graphs. s: Eulerian graphs, Hamiltonian graphs. ngs: Vertex colourings of graphs. Edge colourings of graphs					
Recommended litera 1. I. Anderson, A firs 2. J. Matoušek and J. New York 1999. 3. S. Jendrol', P. Miho	ture: t course in discrete mathematics, Springer-Verlag London, 2001. Nešetřil, Invitation to discrete mathematics, Oxford University Press Inc., bk: Diskrétna matematika I, UPJŠ Košice 1992.					
Course language: Slovak						
Notes:						

Course assessm Total number of	nent f assessed studen	ts: 398				
А	В	С	D	Е	FX	
17.84	20.35	21.86	22.11	14.82	3.02	
Provides: doc. RNDr. Roman Soták, PhD., RNDr. Alfréd Onderko, PhD., RNDr. Zuzana Šárošiová, PhD.						
Date of last modification: 16.04.2022						
Approved: prof	Approved: prof. RNDr. Gabriel Semanišin, PhD., prof. RNDr. Ivan Žežula, CSc.					

Faculty: Faculty of Science

Course ID: ÚMV/	Course name: Discrete mathematics II
DSMb/10	

Course type, scope and the method:

Course type: Lecture / Practice

Recommended course-load (hours): Per week: 2 / 2 **Per study period:** 28 / 28

Course method: present

Number of ECTS credits: 5

Recommended semester/trimester of the course: 4.

Course level: I.

Prerequisities: ÚMV/DSMa/10 or ÚMV/DSM3a/10

Conditions for course completion:

In the covered areas of graph theory, the ability to formulate definitions and statements, to present proofs of statements, to explain individual steps in proofs and to solve selected problems related to given topics is required.

During the semester (continuous assessment) two tests take place, from which 50% of points can be obtained, and from the oral exam alike 50% can be obtained. Evaluation: A ... at least 90%, B ... at least 80%, C ... at least 70%, D ... at least 60%, E ... at least 50%, FX ... less than 50%.

Learning outcomes:

Acquired knowledge of basic areas of graph theory, overview of used objects and properties, understanding of important statements and methods, knowledge of possible applications and the ability to formulate and solve problems in this area.

Brief outline of the course:

- (week 1) Introduction to graphs (graph relations, graph operations, special graph classes)

- (week 2-3) Connectivity and distance in graphs (connectedness of vertices, eccentricity, incidence matrix)

- (week 4) (Spanning) Trees (trees isomorphism)
- (week 5-6) Connectivity in graphs (vertex and edge k-connectedness)
- (week (7-8) Independence and coverings (independent set, matching, vertex and edge covering)
- (week 9-10) Extremal graph theory (Ramsey numbers, Turán graphs)
- (week 11-13) Graph colorings (vertex coloring, chromatic polynomial, edge coloring)
- (week 14) Directed graphs (strong/weak connectedness, tounaments, acyclic graphs)

Recommended literature:

- 1. A. Bondy, U.S.R. Murty, Graph theory, Springer, 2008
- 2. G. Chartrand, L. Lesniak, P. Zhang, Graphs and digraphs, CRC Press, 2011
- 3. R. Diestel, Graph Theory, Springer, 2017
- 4. D. West, Introduction to Graph Theory, Pearson, 2001

Course language:

Slovak

Course assessm Total number o	nent f assessed studen	ts: 211				
А	В	С	D	Е	FX	
14.69	12.32	24.17	25.59	18.01	5.21	
Provides: RNDr. Igor Fabrici, Dr. rer. nat., univerzitný docent, RNDr. Daniela Matisová						
Date of last modification: 16.04.2022						
Approved: prof	Approved: prof. RNDr. Gabriel Semanišin, PhD., prof. RNDr. Ivan Žežula, CSc.					

University: P. J. Šaf	árik University in Košice		
Faculty: Faculty of	Science		
Course ID: ÚMV/ DSMc/10Course name: Discrete mathematics III			
Course type, scope Course type: Lectu Recommended cou Per week: 2 / 2 Per Course method: pr	and the method: ure / Practice urse-load (hours): r study period: 28 / 28 resent		
Number of ECTS c	redits: 5		
Recommended sem	ester/trimester of the course: 5.		
Course level. I			

Prerequisities: ÚMV/DSMb/10

Conditions for course completion:

To complete the course, it is necessary to demonstrate the ability to formulate definitions and statements from the lectured material, to understand the relationship between them, to demonstrate the proofs of statements and solve selected problems based on the presented areas of graph theory. The evaluation is given on the basis of semester assessment, activity in exercises and the result of an exam consisting of a final test and an oral part. The semester assessment takes the form of two written tests (focusing on exercises related to the lectured material) during the semester; a maximum of 25 points can be obtained for each of them. A maximum of 50 points can be obtained for the final test and a maximum of 25 points for the oral part of the exam (consisting of two theoretical questions). During the semester, each student can get a maximum of 10 bonus points for the active approach presented at the seminars on the subject.

The summary evaluation is calculated by the formula max $\{\max \{a, b\} + c, a + b + c / 2\} + d + e$, where a resp. b is the number of points obtained from the semester tests, c is the number of points from the final test, d is the number of points for the oral part of the exam, and e are points for activity at the seminars. To pass the exam, it is necessary to obtain a total of at least 50 points (otherwise the exam is evaluated by FX), while the rating E is given in the case of points 51-59, D in the case of 60-69, C in the case of 70-79, B in the case of 80-89 and A in the case of more than 90 points.

Learning outcomes:

After completing the course, the student is acquainted (following the prerequisity subject Discrete Mathematics I and II) with other core topics and results of graph theory, which will give the comprehensive insight and knowledge of this area of mathematics.

Brief outline of the course:

Week 1 and 2: Eulerian and hamiltonian graphs.

Week 3 and 4: Measures of connectivity in graphs, Menger theorem and its corollaries.

Week 5: Perfect matchings, Tutte theorem.

Week 6 and 7: Planar graphs and their basic properties, Euler formula and its corollaries.

Week 8: Characterization of planar graphs, theorem of Kuratowski.

Week 9: Structural properties of planar and polyhedral graphs.

Week 10: Chromaticity of planar graphs.

Week 11: Measures of graph nonplanarity I - crossing number and its estimates, crossing lemma.

Week 12: Measures of graph nonplanarity II - the genus of graph, Eulerova theorem for embedded graphs, chromaticity of embedded graphs.

Week 13: Edge colorings, Vizing theorem

Recommended literature:

D.B. West: Introduction to graph theory (2nd edition), Prentice Hall 2001

A. Bondy and U.S.R. Murty: Graph theory, Springer-Verlag 2008

G. Chartrand, L. Lesniak, and P. Zhang, Graphs and digraphs, CRC Press 2011

R. Diestel: Graph Theory (4th edition), Springer-Verlag 2010

Course language:

Slovak or English

Notes:

Course assessment

Total number of assessed students: 89

А	В	С	D	Е	FX
16.85	30.34	14.61	24.72	13.48	0.0

Provides: prof. RNDr. Tomáš Madaras, PhD.

Date of last modification: 16.04.2022

Approved: prof. RNDr. Gabriel Semanišin, PhD., prof. RNDr. Ivan Žežula, CSc.

	COURSE INFORMATION LETTER
University: P. J. Šafá	rik University in Košice
Faculty: Faculty of S	cience
Course ID: ÚMV/ DYS/19	Course name: Dynamic systems
Course type, scope a Course type: Lectur Recommended cour Per week: 2 / 2 Per Course method: pre	nd the method: re / Practice rse-load (hours): study period: 28 / 28 esent
Number of ECTS cr	edits: 5
Recommended seme	ster/trimester of the course: 5.
Course level: I.	
Prerequisities: ÚMV	/MANb/19 or ÚMV/MAN2b/22 or ÚMV/FRPb/19
Conditions for cours Ongoing evaluation t based on a result of m (40%).	te completion: takes the form of a written test during the semester. The overal evaluation is hid-term evaluation (60%) and the result of final written and oral examination
Learning outcomes: The course provides theoretical and practi Emphasis is put on an	s students deep knowledge of the theory of dynamical systems from the cal point of view (their modeling, their properties and numerical simulation). In interdisciplinary approach and hte usage of software.
 Brief outline of the c 1. Basic notions of th 2. Differential equation methods of solution. 3. Difference equation 4. Existence, unique 	ourse: e theory of dynamical systems and their properties. ons of n-th order and systems of differential equations - their relationship, ns and systems - methods of solution. ness and continuation of Cauchy problem.

5. Stability and chaotic behavior of the dynamical systems, bifurcation.

6. Numerical methods as dynamical systems, analysis of algorithms.

7. Applications of dynamical systems in computer science.

Recommended literature:

1. Brunovský, P., Diferenčné a diferenciálne rovnice (vysokoškolský učebný text), FMFI UK, 2011

http://www.iam.fmph.uniba.sk/skripta/brunovsky/ddrtext.pdf

2. L. Kluvánek, I. Mišík, M. Švec: Matematika II, SVTL, Bratislava, 1961.

3. N. M. Matvejev: Zbierka príkladov z obyčajných diferenciálnych rovníc, ALFA, Bratislava,

4. Stuart, A.M.; Humphries, A.R. (1996), Dynamical Systems and Numerical Analysis, **Cambridge University Press**

5. Jacques M. Bahi and Christophe Guyeux. 2013. Discrete Dynamical Systems and Chaotic Machines: Theory and Applications. CRC Press, Inc., Boca Raton, FL, USA. 1970.

6. Kelley, C. T. (1995). Iterative Methods for Linear and Nonlinear Equations. SIAM.

7. Kelley, C.T. (1999) Iterative Methods for Optimization. In: Frontiers in Applied Mathematics, Vol. 18, SIAM

Course langua Slovak	Course language: Slovak					
Notes:						
Course assessment Total number of assessed students: 170						
А	В	С	D	Е	FX	
20.59	22.35 14.71 21.76 17.06 3.53					
Provides: doc. Mgr. Jozef Kisel'ák, PhD.						
Date of last modification: 15.04.2022						
Approved: pro	Approved: prof. RNDr. Gabriel Semanišin, PhD., prof. RNDr. Ivan Žežula, CSc.					

×	
University: P. J. Šafá	rik University in Košice
Faculty: Faculty of S	cience
Course ID: ÚMV/ FRPa/19	Course name: Function of real variable
Course type, scope a Course type: Lectur Recommended cour Per week: 2 / 4 Per Course method: pre	nd the method: re / Practice rse-load (hours): study period: 28 / 56 esent
Number of ECTS cr	edits: 7
Recommended seme	ster/trimester of the course: 1., 3.
Course level: I.	
Prerequisities:	
Conditions for cours Continuous assessm homework, writing th	e completion: ent of student's work during the semester (submission of compulsory nree tests). Final test and oral discussion on the topics of the subject.
Learning outcomes: The course provides of real functions of o	an introductory knowledge on basic tools of differential and integral calculus ne real variable, and a development of certain calculation skills in the field.
Brief outline of the c 1. Basics of mathema 2. Real functions - ba 3. Continuity of a rea 4. Derivative of a function 5. Basic of differentia optimisation, geomet 6. Primitive function 7. Newton definite in weeks)	ourse: tical logic and notations (1 week) isic notions, operation, graphs and their transformations (2 weeks) I-valued function (1 week) iction using the geometric concepts, rules of differentiation (2 weeks) ial calculus - relations with monotonicity and convexity, extremas, using in ric and physics tasks (2 weeks) , methods of their finding (3 weeks) itegral - methods of its computation, using in geometric and physics tasks (2
Recommended litera 1. Kulcsár, Š Kulcs 2. Kulcsár, Š Kulcs 3. Hutník, O Kulcs UPJŠ, 2011. 4. Demidovič, B. P.: 5. Brannan, D.: A Fin Cambridge 2006. 6. Bruckner, A. M., E ClassicalRealAnalysi 7. Zorich, V. A.: Mat	 hture: árová, O.: Zbierka úloh z matematickej analýzy I., UPJŠ, 2002. bárová, O.: Zbierka úloh z matematickej analýzy II., UPJŠ, 2003. ár, Š Kulcsárová, O Mojsej, I.: Zbierka úloh z matematickej analýzy III., Sbírka úloh a cvičení z matematické analýzy, Fragment, Praha, 2003. St Course in Mathematical Analysis, Cambridge University Press, Bruckner J. B., Thomson, B. S.: Real Analysis, Second Edition, is.com, 2008. hematical Analysis I, Springer-Verlag 2002.
Course language: Slovak	

Notes:

Course assessment Total number of assessed students: 839					
А	A B C D E FX				
8.82	8.82 8.22 16.92 21.33 31.7 12.99				12.99
Provides: prof. RNDr. Ondrej Hutník, PhD., RNDr. Lenka Halčinová, PhD., RNDr. Jana Borzová, PhD., Mgr. Kristína Hurajová					
Date of last modification: 16.04.2022					
Approved: prof	Approved: prof. RNDr. Gabriel Semanišin, PhD., prof. RNDr. Ivan Žežula, CSc.				

Page: 51

University: P. J. Šafárik University in Košice					
Faculty: Faculty of S	Faculty: Faculty of Science				
Course ID: ÚMV/ FRPb/19	Course name: Function of real variables				
Course type, scope a Course type: Lectu Recommended cou Per week: 4 / 3 Per Course method: pr	and the method: re / Practice rse-load (hours): study period: 56 / 42 esent				
Number of ECTS cr	redits: 8				
Recommended seme	ester/trimester of the course: 2., 4.				
Course level: I.					
Prerequisities: ÚMV	//FRPa/19				
Conditions for cour Ongoing evaluation Overall evaluation is	se completion: takes the form of small tests, projects and one main test during the semester. given by ongoing evaluation (60%), written and oral part of the exam (40%).				
Learning outcomes: The course provides and computer science mathematical way of	students the basics of mathematical analysis necessary to study physics e and related fields. The students also learn mathematical culture, notation and f thinking and expression.				
Brief outline of the	course:				
 Numerical sequen Metric space, norr Function of severa Infinite series of n 	ces. ned space - Euclid space, some topological properties of points and sets. al real variables - basic notions, limit and continuity. umbers				
 5. The integral calculus of function of one real variable: a) Definite Riemann integral - definition, basic properties, calculation methods, classes of integrable functions, applications; b) improper integral 					
6. Differential calculus of functions of one variable. Functional, power and Taylor series of functions of one variable.					
 7. Ordinary differential equations - basic notions, equations of the first order (equations leading to separable and linear), linear equations of 2nd order with constant coefficients. 8. Differential calculus of functions of several real variables - partial derivative, differentiability and total differential (also of higher order), Taylor polynomial, directional derivative, local and global extrema, constrained local extrema. 9. Double (two-dimensional) integral - definition, calculation, applications. 					
Recommended liter 1. B. Mihalíková, J. Košiciach, Košice, 2 2. L. Kluvánek, I. M 3. Z. Došlá, O. Došly Masarykova univerz	ature: Ohriska: Matematická analýza 1, 2, vysokoškolský učebný text, UPJŠ v 000, 2007. išík, M. Švec: Matematika I, II, SVTL, Bratislava, 1959. ý: Diferenciální počet funkcí více proměnných, vysokoškolský učebný text, ita v Brne, Brno, 2003.				

4. J. Kopáček: Matematická analýza nejen pro fyziky I, II, Matfyzpress, Praha, 2004, 2007.

5. J. C. Robinson: An introduction to ordinary differential equations, Cambridge University Press, Cambridge, 2004.

6. R. E. Williamson, H. F. Trotter: Multivariable mathematics, Prentice Hall (Pearson), Upper Saddle River, 2004.

7. B. S. Thomson, J. B. Bruckner, A. M. Bruckner: Elementary real analysis, Prentice Hall (Pearson), Lexington, 2008.

Course language:

Slovak

Notes:

Course assessment

Total number of assessed students: 555

А	В	С	D	Е	FX
10.81	12.61	15.32	21.44	34.05	5.77

Provides: doc. Mgr. Jozef Kisel'ák, PhD., RNDr. Jaroslav Šupina, PhD.

Date of last modification: 15.04.2022

Approved: prof. RNDr. Gabriel Semanišin, PhD., prof. RNDr. Ivan Žežula, CSc.

					
University: P. J. Šafá	University: P. J. Šafárik University in Košice				
Faculty: Faculty of S	cience				
Course ID: ÚINF/ FUN1/21	Course name: Functional programming				
Course type, scope a Course type: Practic Recommended cour Per week: 3 Per stu Course method: pre	nd the method: ce cse-load (hours): dy period: 42 csent				
Number of ECTS cr	edits: 3				
Recommended seme	ster/trimester of the course: 5.				
Course level: I.					
Prerequisities:					
Conditions for cours Evaluation of active project.	e completion: participation in exercises and evaluation of homeworks. Work on a semester				
Learning outcomes: To learn bases of decl and basic methods of	arative programming (as complementary method to procedural programming) implementations of functional programming language Haskell.				
 Brief outline of the c 1. Introduction to fun 2. Types, types of typ 3. Syntax and the mo 4. Recursion 5. Lists 6. Data analysis 1. 7. Data analysis 2. 8. Data analysis 3. 9. Graphic outputs 10. Functions of high 11. Creating your ow 12. Monads 	ourse: ctional programming es, type variables st important specifics of the Haskell language er ranks n types				
Recommended litera ABELSON, H. a G. J Cambridge: MIT Pres LIPOVAČA, Miran. Starch Press, 2011. IS O'SULLIVAN, Bryan 'Reilly, 2008. ISBN 9 Course language:	ture: . SUSSMAN. Structure and interpretation of computer programs. ss, 2002. ISBN 0-262-01153-0. Learn you a haskell for great good!: a beginner's guide. San Francisco: No SBN 978-1-59327-283-8. n, Don STEWART a John GOERZEN. Real world Haskell. Beijing: O 078-0-596-51498-3.				
Slovak or English					

Course assessment					
Total number o	i assessed studen	18.95			
Α	A B C D E FX				FX
44.21	13.68	16.84	14.74	10.53	0.0
Provides: doc. RNDr. Ondrej Krídlo, PhD.					
Date of last modification: 23.11.2021					
Approved: prof. RNDr. Gabriel Semanišin, PhD., prof. RNDr. Ivan Žežula, CSc.					

University: P. J. Šafárik University in Košice				
Faculty: Faculty of S	cience			
Course ID: ÚINF/ ANO/15	Course name: Image analysis			
Course type, scope a Course type: Lectur Recommended cour Per week: 2 / 2 Per Course method: pre	nd the method: re / Practice rse-load (hours): study period: 28 / 28 esent			
Number of ECTS cr	edits: 4			
Recommended seme	ster/trimester of the course: 5.			
Course level: I., II.				
Prerequisities:				
Conditions for course Rules of the final exa on the practical assig Rules to pass the sub calculated based on t	e completion: mination: two parts of the final exam - theoretical oral exam and disscussion nment. oject: Get at least 50% from both parts of the final exam. The grade will be he result from the final exam and assignments during semester.			
Learning outcomes: To examine selected of evaluate them on pra-	computer vision methods. To get an ability to implement chosen solutions and ctical problems.			
Brief outline of the c 1. Introduction to cor 2. Image processin mathematical morpho 3. Segmentation, edg 4. Recognition, featu 5. Textures, image al 6. Third dimension in 7. Structure from mo	ourse: nputer vision, scanning, representation, and properties of images, noise. g, point operators, convolution, Fourier transformation, binary iamge, ology. e detection, Hough transform, active contour model. res, machine learning. ignment and stitching. n images, epipolar geometry, depth information, 3D reconstruction. tion, Kalman filter, particle filter, SLAM.			
 7. Structure from motion, Kalman filter, particle filter, SLAM. Recommended literature: SZELISKI, Richard. Computer Vision: Algorithms and Applications. London: Springer, 2010. Texts in computer science. ISBN 978-1-84882-934-3. ŠONKA, MIlan, HLAVÁČ, Václav a Roger BOYLE: Image Processing, Analysis, and Machine Vision. Cengage Learning, 2014. ISBN 978-1-133-59360-7. ŠONKA, Milan a Václav HLAVÁČ. Počítačové vidění: první česká kniha o zpracování digitalizovaných obrazů ; rozpoznávání objektů v obrazech ; analýza trojrozměrných a pohybujících se objektů ; příklady aplikací počítačového vidění. Praha: Grada, 1992. Nestůjte za dveřmi (Grada). ŠIKUDOVÁ, Elena. Počítačové videnie: detekcia a rozpoznávanie objektov. Praha: Wikina, [2014]. ISBN 978-80-87925-06-5. 				

Course language:

Slovak language. English is required for reading recommended literature and OpenCV library documentation.

Notes:					
Course assessm	Course assessment				
Total number o	f assessed studen	ts: 52			
А	B C D E FX				FX
40.38	17.31	17.31	7.69	17.31	0.0
Provides: RND	Provides: RNDr. Miroslav Opiela, PhD.				
Date of last modification: 22.09.2021					
Approved: prof	f. RNDr. Gabriel	Semanišin, PhD.	, prof. RNDr. Iva	an Žežula, CSc.	

University: P. J. Šafá	rik University in Košice
Faculty: Faculty of S	cience
Course ID: ÚINF/ ZIV1/21	Course name: Internet of Things
Course type, scope a Course type: Practi- Recommended cou Per week: 3 Per stu Course method: pre	and the method: ce rse-load (hours): ady period: 42 esent
Number of ECTS cr	edits: 4
Recommended seme	ster/trimester of the course: 4., 6.
Course level: I.	
Prerequisities: ÚINF	5/PAZ1a/15
Conditions for cours Graded activities: sm Rules to pass the sul report. Get at least 50	Se completion: Hall assignments, final complex project. bject: Create the final project matching minimal requirements and write the D% of points from assignments.
an ability to design a microcontrollers, inte	in the field of Internet of Things and to understand basic concepts. To get and implement particular IoT solutions (connecting sensors and actuators to er-device communication, data processing and cloud services).
 Brief outline of the of 1. Introduction to IoT Arduino, program (button, LED, potent Serial communica (Arduino). Digital synchrono I2C expander, buzzer Sensor data, overv Application layer p Node-RED, open-4 Raspberry PI, rem Cloud computing, 10. Machine learning evaluation. Existing solution; 	 course: C, repetition of physics curriculum covering direct current, voltage divider. ming in Arduino IDE, sensors and actuators, basic components connection iometer, photoresistor). tion, UART, turtle graphics (Java) in connection with sensors and actuators us and asynchronous communication, SPI, I2C protocol, 7-segment display, and creating melodies. iew of sensor modules, smartphone sensors, filtering measured values. protocols (MQTT), overview of IoT protocols. data processing, IoT dashboard, connection with Arduino. ote access, security in IoT. AWS services dedicated to IoT. g, basic overview from the IoT point of view, focus on data preprocessing and s - projects developed by students and IT companies.
Recommended litera 1. SELECKÝ, Matúš Computer Press, 201 2. UPTON, Eben a G vydání. Přeložil Jaku 3. MONK, Simon. Pr	Iture: Arduino: uživatelská příručka. Přeložil Martin HERODEK. Brno: 6. ISBN 9788025148402. Gareth HALFACREE. Raspberry Pi: uživatelská příručka. 2., aktualizované b GONER. Brno: Computer Press, 2016. ISBN 9788025148198. rogramming Arduino, 2. vyd, McGraw-Hill, 2016. ISBN 9781259641633

Course language:

Slovak language. English language is required for accessing AWS and other resources.

Notes:

Course assessment Total number of assessed students: 66 С А В D Е FX 9.09 68.18 9.09 7.58 3.03 3.03 Provides: RNDr. Miroslav Opiela, PhD., RNDr. Viktor Pristaš Date of last modification: 08.01.2022 Approved: prof. RNDr. Gabriel Semanišin, PhD., prof. RNDr. Ivan Žežula, CSc.

University: P. J. Šafá	rik University in Košice			
Faculty: Faculty of S	Faculty: Faculty of Science			
Course ID: Dek. PF UPJŠ/USPV/13	Course ID: Dek. PF Course name: Introduction to Study of Sciences JPJŠ/USPV/13			
Course type, scope a Course type: Lectur Recommended cour Per week: Per stud Course method: pre	nd the method: re / Practice rse-load (hours): y period: 12s / 3d esent			
Number of ECTS cro	edits: 2			
Recommended seme	ster/trimester of the cours	e: 1.		
Course level: I.				
Prerequisities:				
Conditions for cours	e completion:			
Learning outcomes:				
Brief outline of the c	ourse:			
Recommended litera	iture:			
Course language:				
Notes:				
Course assessment Total number of assessed students: 2196				
	abs n			
89.34 10.66				
Provides: doc. RNDr. Marián Kireš, PhD.				
Date of last modification: 30.08.2022				
Approved: prof. RNI	Approved: prof. RNDr. Gabriel Semanišin, PhD., prof. RNDr. Ivan Žežula, CSc.			

University: P. J. Šafárik University in Košice								
Faculty: Faculty of Science								
Course ID: ÚINF/ UGR1/15	Course na	me: Introduction	n to computer gra	phics				
Course type, scope and the method: Course type: Lecture / Practice Recommended course-load (hours): Per week: 2 / 2 Per study period: 28 / 28 Course method: present								
Number of ECTS c	redits: 5							
Recommended sem	ester/trimes	ster of the course	e: 3., 5.					
Course level: I., II.								
Prerequisities:								
Conditions for cour	se completi	on:						
Learning outcomes To provide the stude graphics.	: ents with know	owledge of graph	nics algorithms a	nd basic principl	es of computer			
Graphics hardware, drawing 2D primitiv spline forms, Bézier perspective and par Rendering techniqu computer animation	input and out ves. Filling a curves, B-sp rallel projec ues, photore , virtual real	tput devices. Colo and clipping. Cur plines, surfaces. I tions. Visible-su alism, textures, ity.	or models, palette ve modeling, inte Homogenous coo rface determinat ray tracing, rac	s. Raster graphics erpolations and a rdinates, affine tr tion, illumination diosity. Object r	s algorithms for pproximations, ransformations, n and shading. representations,			
Recommended literature: FOLEY, J. D., van DAM, A., FEINER, S., HUGHES, J.: Computer Graphics: Principles and Practice, Addison-Wesley, 1991 MORTENSON, M.E.: Geometric modeling, 2.ed., Willey, 1997								
Course language:								
Notes:								
Course assessment Total number of assessed students: 326								
А	В	С	D	E	FX			
12.58 10.12 13.8 23.62 32.21 7.67								
Provides: RNDr. Rastislav Krivoš-Belluš, PhD., doc. RNDr. Jozef Jirásek, PhD.								
Date of last modification: 08.01.2022								
Approved: prof. RNDr. Gabriel Semanišin, PhD., prof. RNDr. Ivan Žežula, CSc.								

University: P. J. Šafá	rik University in Košice
Faculty: Faculty of S	cience
Course ID: ÚMV/ UAD/10	Course name: Introduction to data analysis
Course type, scope a Course type: Lectur Recommended cour Per week: 1 / 1 Per Course method: pre	nd the method: re / Practice rse-load (hours): study period: 14 / 14 esent
Number of ECTS cr	edits: 2
Recommended seme	ster/trimester of the course: 1.
Course level: I.	
Prerequisities:	
Conditions for cours Test (40p) and individ Oral presentation of t At least 50% must be Final evaluation: ≥90	e completion: dual project work (20p). he individual project work (5p). obtained from each part. % A; ≥80% B; ≥70% C; ≥60% D; ≥50% E; <50% FX.
To know the basic p understand its import To understand elemen To gain experience in	purpose of statistical data analysis, its methods and statistical thinking and ance for science and practical life. htary statistical concepts. handling real data using spreadsheet Excel and statistical software R.
 Brief outline of the c 1. Introduction (the b statistics) 2. Collecting Data (ty 3. Handling Data (v skewness and kurtosi 4. Relationships in da 5. Statistical inference 	ourse: asic philosophy and aim of statistical data analysis, descriptive and inductive opes of data, random sample, randomized experiment) visualization, summarizing – measures of center, measures of variability, s, empirical rule) - 5 weeks ata (introduction to regression and correlation) - 4 weeks e (elementary view into estimation and testing hypothesis) - 2 weeks
Recommended litera 1. Anděl, J.: Statistich 2. Rossman, A.J. et a 2009 3. Utts, J.M.: Seeing 4. Utts, J.M., Heckard 5. Zvára, K., Štěpán, Czech)	ture: ké metody, Matfyzpress, Praha, 1998 (in Czech) l.: Workshop Statistics: Discovery with Data and Fathom, 3rd ed. Wiley, Through Statistics, 4th ed., Thomson Brooks/Cole, Belmont, 2014 d R.F.: Mind on Statistics, 6th ed. Thomson Brooks/Cole, Belmont, 2021 J.: Pravděpodobnost a matematická statistika, Matfyzpress, Praha, 2001 (in
Course language: Slovak	
Notes:	

Course assessn	nent							
Total number o	f assessed studen	ts: 434						
А	В	С	D	Е	FX			
36.87	36.87 25.12 26.04 10.37 0.46 1.15							
Provides: doc.	RNDr. Martina H	ančová, PhD.						
Date of last modification: 13.09.2021								
Approved: prot	Approved: prof. RNDr. Gabriel Semanišin, PhD., prof. RNDr. Ivan Žežula, CSc.							

University: P. J. Šafárik University in Košice							
Faculty: Faculty of S	cience						
Course ID: ÚINF/ UIB1/21	Course name: Introduction to information security						
Course type, scope a Course type: Lectur Recommended cou Per week: 2 / 2 Per Course method: pre	Course type, scope and the method: Course type: Lecture / Practice Recommended course-load (hours): Per week: 2 / 2 Per study period: 28 / 28 Course method: present						
Number of ECTS cr	edits: 5						

Recommended semester/trimester of the course: 3.

Course level: I., N

Prerequisities:

Conditions for course completion:

The condition for passing the course is: 1. Exercise tasks (20% of the total number of points), 2. Homeworks (30% of the total number of points), 3. Written final theoretical exam (25% of the total number of points), 4. Written final practical exam (25% of the total number of points).

Learning outcomes:

The result of the education is an understanding of the basic concepts of information security from the technical, legal and procedural views of point.

Brief outline of the course:

1. Introduction to information security and information security model, 2. Information security management, 3. Risk and risk management, 4. Legal, normative and ethical aspects of information security, 5. Continuity management of activities, processes and security incidents handling, 6. Introduction to cryptology, 7. Access control, 8. Physical and environmental security, 9. Human resources security and social engineering, 10. End point security and malicious code, 11. Computer network security, 12. Application security, 13. Final exam.

Recommended literature:

1. MARTIN, Andrew, Awais RASHID, Steve SCHNEIDER a Howard CHIVERS. CyBOK: The Cyber Security Body of Knowledge. The National Cyber Security Centre, 2021, 2. ANDRESS, Jason, Awais RASHID, Steve SCHNEIDER a Howard CHIVERS. Foundations of Information Security: A Straightforward Introduction. 1. No Starch Press, 2019. ISBN 978-1718500044, 3. PELTIER, Thomas, Awais RASHID, Steve SCHNEIDER a Howard CHIVERS. Information Security Fundamentals. 2. Boca Raton: Auerbach Publications, 2013. ISBN 978-1138436893.

Course language:

Slovak or English

Course assessment								
Total number o	f assessed studen	ts: 153						
А	A B C D E FX							
39.22	26.14	22.22	6.54	2.61	3.27			
Provides: doc.	Provides: doc. RNDr. JUDr. Pavol Sokol, PhD., RNDr. Eva Marková							
Date of last modification: 04.01.2022								
Approved: prot	Approved: prof. RNDr. Gabriel Semanišin, PhD., prof. RNDr. Ivan Žežula, CSc.							

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University: P. J. Šafá	rik University in Košice
Faculty: Faculty of S	cience
Course ID: ÚINF/ USU/19	Course name: Introduction to machine learning
Course type, scope a Course type: Lectur Recommended cour Per week: 2 / 2 Per Course method: pre	nd the method: re / Practice rse-load (hours): study period: 28 / 28 esent
Number of ECTS cr	edits: 5
Recommended seme	ster/trimester of the course: 3.
Course level: I., N	
Prerequisities:	
Conditions for cours Creating a project f application domain. interpretation of data focused on selected r	completion: Cocused on the application of machine learning algorithms in a selected Continuous written work focused on the preparation, processing and a using machine learning methods. Successful completion of an oral exam nachine learning methods.
Learning outcomes: Theoretical knowledge machine learning alg	ge in the area of machine learning. Basic concepts of machine learning. Basic orithms.
Brief outline of the c 1. Basic concepts of f 2. Basic characteris dependence between 3. Data sources and t 4. Preparation and cle 5. Classification task 6. Selected classificat 7. Evaluation of mod 8. Classification accu 9. Cluster analysis. 10. Association rules 11. Prediction tasks a 12. Prediction accura	ourse: machine learning. tics of data, types of attributes, characteristics for individual attributes, attributes. heir acquisition. Determining the target task. eaning of data, missing values, incorrect inputs. s tion methods els - true positive, false positive, true negative, false negative examples. tracy indicators.
Recommended litera 1. AGGARWAL, Cha 978-3-319-14141-1. 2. ALPAYDIN, Ethen 2014. ISBN 978-0-26 3. RASCHKA, Sebas Deep Learning with 1 2019. ISBN 978-178	Iture: aru C. Data mining: a textbook. Cham: Springer, 2015. ISBN m. Introduction to machine learning. 3rd ed. Massachusetts: MIT Press, 52-02818-9. stian, Mirjalili, Vahid. Python Machine Learning: Machine Learning and Python, scikit-learn, and TensorFlow 2, 3rd Edition, Packt Publishing Ltd., 9955750.

4. WITTEN, I. H., Eibe FRANK a Mark A. HALL. Data mining: practical machine learning tools and techniques. 4th ed. Amsterdam: Morgan Kaufmann, 2017. Morgan Kaufman series in data management systems. ISBN 9780128042915.

Course language:

Slovak or English

Notes:

Content prerequisites:

Basics of programming in Python, or another alternative programming language suitable for data analysis

Course assessment

Total number of assessed students: 30

А	В	С	D	Е	FX
90.0	6.67	3.33	0.0	0.0	0.0

Provides: doc. RNDr. L'ubomír Antoni, PhD.

Date of last modification: 20.09.2021

Approved: prof. RNDr. Gabriel Semanišin, PhD., prof. RNDr. Ivan Žežula, CSc.

University: P. J. Šafárik University in Košice
Faculty: Faculty of Science
Course ID: ÚMV/ Course name: Introduction to mathematics UDM/22
Course type, scope and the method: Course type: Practice Recommended course-load (hours): Per week: 4 Per study period: 56 Course method: present
Number of ECTS credits: 3
Recommended semester/trimester of the course: 1.
Course level: I.
Prerequisities:
Conditions for course completion: Two tests during the semester.
Learning outcomes: Repetition of problematic sections of the secondary mathematics by interesting tasks. Explanation of basic terms, properties and proof methods used in various areas of mathematics.
Brief outline of the course: 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. Exponencial and logarithmic function; equations and inequalities. Goniometric functions; equations and inequalities. Complex numbers.
 Recommended literature: 1. V. Medek - L. Mišík - T. Šalát: REPETITÓRIUM STREDOŠKOLSKEJ MATEMATIKY, Alfa Bratislava, 1976 2. S. Richtárová - D. Kyselová: MATEMATIKA (pomôcka pre maturantov a uchádzačov o štúdium na vysokých školách), Enigma Nitra, 1998 3. O. Hudec – Z. Kimáková – E. Švidroňová: PRÍKLADY Z MATEMATIKY (pre uchádzačov o štúdium na TU v Košiciach), EF TU Košice, 1999 4. F. Peller – V. Šáner – J. Eliáš – Ľ. Pinda: MATEMATIKA – Podklady na prijímacie testy pre uchádzačov o štúdium, Ekonóm Bratislava, 2000/2001 5. F. Vesajda – F. Talafous: ZBIERKA ÚLOH Z MATEMATIKY pre stredné všeobecnovzdelávacie školy a gymnáziá, SPN Bratislava, 1973 6. J. Lukášová – O. Odvárko – B. Riečan – J. Šedivý – J. Vyšín: ÚLOHY Z MATEMATIKY pre 4. ročník gymnázia, SPN Bratislava, 1976
Notes:

Course assessment Total number of assessed students: 600								
А	A B C D E FX							
23.83	20.5	18.17	15.33	9.67	12.5			
Provides: RND	Provides: RNDr. Veronika Hubeňáková, PhD., RNDr. Zuzana Gönciová							
Date of last modification: 29.01.2022								
Approved: prof. RNDr. Gabriel Semanišin, PhD., prof. RNDr. Ivan Žežula, CSc.								

OUDSE INFORMATION I ETTER

	COURSE INFORMATION LETTER
University: P. J. Šafá	rik University in Košice
Faculty: Faculty of S	cience
Course ID: ÚINF/ UNS1/15	Course name: Introduction to neural networks
Course type, scope a Course type: Lectur Recommended cour Per week: 2 / 2 Per Course method: pre	nd the method: re / Practice rse-load (hours): study period: 28 / 28 esent
Number of ECTS cr	edits: 5
Recommended seme	ster/trimester of the course: 5.
Course level: I., N	
Prerequisities:	
Conditions for cours The condition for par networks, successful types, and genetic alg exam.	se completion: ssing the course is the realization of a project with the application of neural completion of two written tests in the field of neural networks, their basic gorithms, as well as successful completion of the written and oral part of the
Learning outcomes: The result of the educ algorithms. The stud analysis and also wor	ation is an understanding of the basic principles of neural networks and genetic ent will gain the ability to apply the acquired knowledge in intelligent data rk with a selected tool for modeling neural networks.
 Brief outline of the c Basic concept arisi calculable by thresho Perceptrons. Linea learning rule, higher Forward neural r method. Recurrent neural r energy function, learning Model of gradually 	ourse: ng from biology. Linear threshold units, polynomial threshold units, functions eld units. r separable objects, adaptation process (learning), convergence of perceptron order perceptrons. networks, hidden neurons, adaptation process (learning), backpropagation networks. Hopfield neural networks, properties, associative memory model, ning, optimization problems (business traveler problem). v created network. ART network, architecture, operations, initialization phase,

recognition phase, search and adaptation phase. Use of the ART network.

6. Applications of studied models in solving practical problems.

7. Written test I.

8. Motivation to model genetic elements. Genetic algorithm. Application of genetic algorithms.

9. Genetic programming, root trees, Read's linear code. Basic stochastic optimization algorithms: blind algorithm and climbing algorithm. Forbidden search method.

10. Genetic and evolutionary programming with typing, examples of use. Grammatical evolution.

11. Special techniques of evolutionary computations. Selection mechanisms in evolutionary algorithms.

12. Use of genetic algorithms in training neural networks. Artificial life.

13. Written test II.

Recommended literature:

1. AGGARWAL, Charu C. Neural networks and deep learning: a textbook. Cham: Springer, 2018. ISBN 978-3319944623.

2. KVASNIČKA, Vladimír. Úvod do teórie neurónových sietí. [Slovenská republika]: IRIS, 1997. ISBN 80-88778-30-1.

3. KVASNIČKA, Vladimír. Evolučné algoritmy. Bratislava: Vydavateľstvo STU, 2000. Edícia vysokoškolských učebníc. ISBN 80-227-1377-5.

4. MITCHEL, Melanie. An Introduction to Genetic Algorithms. Cambridge: MIT Press, 2002. ISBN 0-262-63185-7.

5. SINČÁK, Peter, ANDREJKOVÁ, G. Úvod do neurónových sietí, I. diel, Košice: ELFA, 1996. ISBN 808878638X

Course language:

Slovak or English

Notes:

Content prerequisites:

Basics of programming in Python, or another alternative programming language suitable for data analysis

Course assessment

Total number of assessed students: 492

А	В	С	D	Е	FX
19.31	17.89	21.34	17.28	20.33	3.86

Provides: doc. RNDr. Ľubomír Antoni, PhD., RNDr. Šimon Horvát, PhD.

Date of last modification: 23.11.2021

Approved: prof. RNDr. Gabriel Semanišin, PhD., prof. RNDr. Ivan Žežula, CSc.

University: P. J	. Šafárik Univer	sity in Košice			
Faculty: Facult	y of Science				
Course ID: ÚIN MZI/21	NF/ Course n	ame: Introductio	n to study of info	ormatics	
Course type, sc Course type: I Recommended Per week: 2 / 2 Course metho	ope and the mo Lecture / Practic d course-load (1 2 Per study per d: present	ethod: e hours): iod: 28 / 28			
Number of EC	FS credits: 5				
Recommended	semester/trime	ester of the cours	e: 1.		
Course level: I.					
Prerequisities:					
Conditions for Understanding	course complet of basic mathem	tion: natical notions			
Learning outco Understanding	omes: of basic mathem	natical notions			
 Brief outline of 1. Mathematica 2. Connections 3. Classes and s 4. Other operaries 5. Relations 6. Relational alg 7. Orderings 8. Equivalences 9. Functions 10. Cardinalities 11. Infinities 12. Cardinal aries 	the course: 1 text and quantifiers sets ions operácie gebra s thmetics				
Recommended	literature:	/1	-1		
Course language Slovak	sk/~krajc1/skola. ge:	vyucba/jesen/pre	amety/MZ1.html		
Notes:					
Course assessment Total number of	ent f assessed stude	nts: 344			
A	В	C	D	E	FX
44.48	21.22	11.34	3.2	1.45	18.31
Provides: prof.	RNDr. Stanislav	/ Krajči, PhD.			
Date of last modification: 23.11.2021

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University: P. J	University: P. J. Safárik University in Košice						
Faculty: Facult	y of Science						
Course ID: ÚM LCO/10	Durse ID: ÚMV/ Course name: Linear and integer programming						
Course type, sc Course type: 1 Recommended Per week: 2 / 2 Course metho	Course type, scope and the method: Course type: Lecture / Practice Recommended course-load (hours): Per week: 2 / 2 Per study period: 28 / 28 Course method: present						
Number of EC	FS credits: 5						
Recommended	semester/trime	ster of the cours	e: 3.				
Course level: I.							
Prerequisities:	ÚMV/ALGa/10						
Conditions for Continuous eva commercial sof condition for fi understanding of	Conditions for course completion: Continuous evaluation: a small test during each tutorial, two large tests, a project with real data and commercial software. Bonus points awarded for homeworks (formulation of proofs). A necessary condition for final exam is at least 50% of points from th semester. Final exam: demonstrate the understanding of the theory and ability of argumentation						
Learning outco Ability to form programs by se ability of exact	Learning outcomes: Ability to formulate practical tasks in a form of a linear program. Proficiency in solving linear programs by several methods, also using software. Understanding of the underlying theory and ability of exact argumentation.						
Brief outline of Formulation of an finiteness. D analysis and pa Gomory cuts. C	Brief outline of the course: Formulation of linear and integer programs. Geometric solution. Simplex method, its correctness an finiteness. Duality and its economic interpretation. Dual and revised simplex method. Sensitivity analysis and parametric programming. Algorithms for integer programming: branch and bound, Gomory cuts. Computational complexity of LP and ILP. Solution of practical problems.						
Recommended literature: Ims.upjs.sk - podklady k prednáškam a zadania úloh na cvičenia. Plesník, Dupačová, Vlach: Lineárne programovanie, Alfa, Bratislava 1990 Ch. Papadimitriou – K. Steiglitz: Combinatorial Optimization: Algorithms and Complexity, 1984 R.J. Vanderbei, Linear Programming:Foundations and Extentions, Springer 2020, electronic version: http://www.princeton.edu/~rvdb/LPbook/							
Course language: Slovak							
Notes:							
Course assessm Total number of	ent f assessed studer	nts: 163					
A	В	C	D	Е	FX		
22.7	17.18	19.63	19.63	17.79	3.07		

Provides: prof. RNDr. Katarína Cechlárová, DrSc., RNDr. Adam Marton

Date of last modification: 17.04.2022

University: P. J	. Šafárik Unive	rsity in Košice			
Faculty: Facult	y of Science				
Course ID: ÚI ZLI/21	NF/ Course	name: Linux basi	28		
Course type, so Course type: 1 Recommended Per week: 2 P Course metho	cope and the m Practice d course-load er study perio d: present	ethod: (hours): d: 28			
Number of EC	TS credits: 2				
Recommended	semester/trim	ester of the cours	se: 1.		
Course level: I.	, N				
Prerequisities:					
Conditions for The condition : Written final th (25% of the tota	course completed for passing the eoretical exam al number of po	course is: 1. Hor (25% of the total points).	neworks (50% o number of points	f the total numb a), 3. Written fina	er of points), 2. l practical exam
Learning outco The result of the studying compu- systems.	omes: he education is iter science, by	an understanding giving the necessar	g of the theoretic ry knowledge in t	cal and practical he usage of Unix/	background for /Linux operating
Brief outline of 1. Introduction files, 5. Manag packages, 8. A Managing netw	The course: to Unix/Linux s ing users, grou dministering the ork interfaces,	ystems, 2. Linux o ups and rights, 6. e system - system 11. Managing disl	mmand line, 3. T Managing proce booting, jobs, l c partitions, 12. E	ext processing to esses, 7. Managin ogging,9. Basic Exam.	ols, 4. Managing ng software and networking, 10.
Recommended literature: 1. LPIC-1 Exam 101. LPI [online]. Canada: The Linux Professional Institute, 2021 [cit. 2021-9-22]. Dostupné z: https://learning.lpi.org/en/learning-materials/101-500/, 2. LPIC-1 Exam 102. LPI [online]. Canada: The Linux Professional Institute, 2021 [cit. 2021-9-22]. Dostupné z: https://learning.lpi.org/en/learning-materials/102-500/, 3. Linux - Dokumentační projekt [online]. 4. Praha: Computer Press, 2007 [cit. 2021-9-22]. Dostupné z: https://i.iinfo.cz/files/root/ k/LDP_4.pdf.					
Course languag Slovak or Engli	ge: ish				
Notes:					
Course assessm Total number o	nent f assessed stude	ents: 155			
А	В	С	D	Е	FX
41.94	20.65	18.71	6.45	5.16	7.1

Provides: doc. RNDr. JUDr. Pavol Sokol, PhD., RNDr. Eva Marková, RNDr. Richard Staňa

Date of last modification: 04.01.2022

University: P. J. Šafán	ik University in Košice
Faculty: Faculty of S	cience
Course ID: ÚINF/ LOP1/15	Course name: Logic programming
Course type, scope a Course type: Lectur Recommended cour Per week: 2 / 2 Per Course method: pre	nd the method: e / Practice rse-load (hours): study period: 28 / 28 sent
Number of ECTS cro	edits: 5
Recommended seme	ster/trimester of the course: 4.
Course level: I., II.	
Prerequisities:	
Conditions for cours Evaluation of active p the semester. Written	e completion: participation in exercises and homework, test of theoretical knowledge during and oral exam together with assessment from exercises.
Learning outcomes: To learn bases of declar and basic methods of	arative programming (as complementary method to procedural programming) implementations of logic programming languages.
Brief outline of the c 1. Introduction to log 2. theory, models, He 3. SLD resolution 4. Basics of Prolog la 5. Prologue in examp 6. Lists 7., 8., 9. Data analysis 10., 11., 12. Graph the	ourse: ic rbrand model nguage les s in Prolog eory in Prolog
Recommended litera BRATKO, Ivan. Prole Wesley, 1990. ISBN (NILSON U., MALUS NIENHUYIS-CHEN Springer-Verlag, 1997	ture: og. Programming for Artificial Intelligence. 2 ed. Wokingham: Addison- 0-201-41606-9. SINSKI J.: Logic, Programming and Prolog, John Wiley & Sons Ltd. 1995 G Sh.H., WOLF R.: Foundations of Inductive Logic Programming, 7
Course language: Slovak or English	
Notes: Prerequisites: none	

Course assessn Total number o	Course assessment Total number of assessed students: 318						
А	A B C D E FX						
24.53	13.52 15.09 22.33 22.64 1.89						
Provides: doc.	Provides: doc. RNDr. Ondrej Krídlo, PhD.						
Date of last modification: 23.11.2021							
Approved: prof. RNDr. Gabriel Semanišin, PhD., prof. RNDr. Ivan Žežula, CSc.							

University: P. J. Šafa	arik University in Košice
Faculty: Faculty of S	Science
Course ID: ÚINF/ MIS/15	Course name: Management of information systems
Course type, scope a Course type: Lectu Recommended cou Per week: 1 / 2 Per Course method: pr	and the method: re / Practice irse-load (hours): r study period: 14 / 28 resent
Number of ECTS ci	redits: 4
Recommended seme	ester/trimester of the course: 4.
Course level: I.	
Prerequisities:	
Conditions for cour Completion of the su during the semester - mastering the basic - mastering the princ - presentation and de Detailed conditions the AIS.	se completion: ibject is conditional on the completion of partial tasks within the group project in an appropriate quality. The project is aimed at: concepts and methods taught, biples of related IT tools, efense of the created project. for evaluating partial tasks and obtaining a final evaluation are published in
Learning outcomess By completing the su - knowledge of the g organisation in relati - knowledge of the p of the company's fur - basic knowledge an - experience of work	ubject, students will gain general aspects of the design and use of information systems for managing the on to the strategic goals of the organisation, rinciples of basic ICT technologies used to manage processes in various areas actioning, nd skills on the use of relevant IT tools, ting in a heterogeneous team and with project presentation.
Brief outline of the 1. Introduction to int 2. Organisational str 3. Managing data an 4. Business Intellige 5. Ethics and privacy 6. Information secur 7. Social computing 8. Electronic comme 9. Wireless and mob 10. The role of infor 11. CRM systems. 12. Management of	<pre>course: formation systems. ategy and the role of information systems in gaining competitive advantage. d knowledge. nce. / protection. ity. erce. ile computing. mation systems within the organisation and public administration.</pre>

13: Procurement and implementation of information systems.

Recommended literature:

1. R. Kelly Rainer, Brad Prince, Hugh J. Watson, Management Information Systems, Wiley 2015, ISBN : 978-1-118-89538-2

2. Voříšek, J.: Strategické řízení informačního systému a systémová integrace, Praha, Management Press, 1999.

3. O'Brien, J., Marakas, G.: Management Information Systems, McGraw-Hill, 2010, ISBN 0073376813.

4. Laudon, K., Traver, C.G.: Management Information Systems: Managing the Digital Firm, Prentice Hall, 2011, ISBN 0132142856.

Course language:

Slovak or English

Notes:

Course assessment

Total number of assessed students: 39

А	В	С	D	Е	FX
35.9	30.77	17.95	10.26	2.56	2.56

Provides: prof. RNDr. Gabriel Semanišin, PhD., RNDr. Richard Staňa

Date of last modification: 25.07.2022

University: P. J.	Šafárik Univers	ity in Košice					
Faculty: Faculty	Faculty: Faculty of Science						
Course ID: ÚM MMD/22	V/ Course na	me: Mathematic	al modeling				
Course type, sc Course type: P Recommended Per week: 3 Pe Course method	Course type, scope and the method: Course type: Practice Recommended course-load (hours): Per week: 3 Per study period: 42 Course method: present						
Number of ECT	FS credits: 3						
Recommended	semester/trimes	ster of the cours	e: 1., 3.				
Course level: I.							
Prerequisities:							
Conditions for Submitting a pro	course completi	on: ecified list of pro	jects and, possi	bly, a related shor	t presentation.		
Learning outco Using concrete approaches and defining the con model.	Learning outcomes: Using concrete examples of problems from real life, students will become familiar with several approaches and strategies for creating a mathematical model of specified problem as well as with defining the conditions related a real problem and transforming them into created mathematical model						
Brief outline of One specified re	Brief outline of the course: One specified real-life problem will be discussed, explored and modeled each week.						
 Recommended literature: 1. E. Lindner, A. Micheletti, C. Nunes (eds.), Mathematical Modelling in Real Life Problems, Springer, 2020. 2. K.K. Tung, Topics in Mathematical Modeling, Princeton University Press, 2007. 3. H. P. Williams, Model Building in Mathematical Programming, Wiley, 2013. 							
Course languag Slovak	Course language: Slovak						
Notes:	Notes:						
Course assessm Total number of	ent assessed studen	ts: 28					
A	В	C	D	Е	FX		
89.29	10.71	0.0	0.0	0.0	0.0		
Provides: RND Fabrici, Dr. rer. 1 PhD., RNDr. Jar	:. Jana Borzová, nat., univerzitný oslav Šupina, Ph Irei Hutník PhD	PhD., prof. RND docent, RNDr. A iD., doc. RNDr. M prof. RNDr. W	r. Katarína Cech ndrej Gajdoš, P Martina Hančov an Žežula, CSc	nlárová, DrSc., RN hD., RNDr. Lenka á, PhD., Mgr. Mar RNDr. Lucia Iar	NDr. Igor a Halčinová, rtin Vodička, učková PhD		

doc. Mgr. Jozef Kisel'ák, PhD., doc. RNDr. Daniel Klein, PhD., prof. RNDr. Tomáš Madaras, PhD.

Date of last modification: 25.08.2022

University: P. J. Šafá	arik University in Košice
Faculty: Faculty of S	Science
Course ID: ÚMV/ MSW/10	Course name: Mathematical software
Course type, scope a Course type: Lectu Recommended cou Per week: 1 / 2 Per Course method: pro	and the method: re / Practice irse-load (hours): study period: 14 / 28 esent
Number of ECTS cr	redits: 3
Recommended seme	ester/trimester of the course: 2.
Course level: I.	
Prerequisities:	
Conditions for course Master the basics of mathematical tools of different areas of ma Test of solving tasks Test of solving tasks Based on ongoing ev Using basic mathema Solving problems in Statistical data proce Implementation of al Operations with math	se completion: of creating tables and graphs in a spreadsheet environment and the basic of a spreadsheet for creating different types of models and solving problems in thematics. in a spreadsheet environment. in the Maple environment. valuation. atical tools of a spreadsheet in solving problems - 4 p. financial mathematics - 4 p. essing, simulation of random phenomena - 4 p. lgorithms, approximate solution of equations - 4 p. rices, solution of systems of linear equations - 4 p.
Learning outcomes: Knowledge and skill types of mathematics of symbolic calculati types of graphs, use methods to solve pro	s of using different representations of data and modeling in solving different al problems in the environment of a spreadsheet, R language and the system ons Maple. Be able to analyze data when working with tables, create different different types of functions implemented in a spreadsheet and mathematical oblems.
 Brief outline of the of 1. Creation and use of 2. Use of different mathematics. 3. Statistical data prod. 4. Implementation of systems of linear equipmentiation of linear equipmentiation of linear optimization. Basic description of linear capabilities of the systems. 	course: of formulas, creation and modification of graphs. types of functions implemented in a spreadsheet, problems from financial occessing, creation of stochastic models, Monte Carlo method. of algorithms in tables, graphical and numerical solution of equations and ations. on, test Maple system and R language, work with matrices and vectors, work with data programming techniques, creating your own functions and scripts, graphical stem for data visualization. Modification of mathematical expressions, solution

of equations and inequalities, mathematical analysis, linear algebra, theory of numbers, graphs and sets in the Maple system.

Recommended literature:

1. Shingareva, Lizárraga-Celaya: Maple and Mathematica. A problem solving approach for mathematics, Springer Wien NewYork, 2007

2. Eberhart: Maple problem solving handbook, University of Kentucky, 2009

3. Šťastný: Matematické a statistické výpočty v Microsoft Excelu, Computer Press 2001

Course language:

Slovak

Notes:

Course assessment

Total number of assessed students: 191

А	В	С	D	Е	FX
25.13	19.9	24.61	19.37	8.38	2.62

Provides: doc. RNDr. Stanislav Lukáč, PhD., doc. RNDr. Daniel Klein, PhD.

Date of last modification: 14.09.2021

University: P. J. Šafá	rik University in Košice
Faculty: Faculty of S	cience
Course ID: ÚMV/ MST/19	Course name: Mathematical statistics
Course type, scope a Course type: Lectur Recommended cour Per week: 2 / 2 Per Course method: pre	nd the method: re / Practice rse-load (hours): study period: 28 / 28 esent
Number of ECTS cr	edits: 5
Recommended seme	ster/trimester of the course: 5.
Course level: I., II.	
Prerequisities:	
Conditions for cours Total evaluation base (30p) and oral part of At least 50% must be Final evaluation: \geq 90	Se completion: d on two written tests during the semester (2x40p) and the result of the written f the exam (30p). e obtained from each part. 10% A; $\geq 80\%$ B; $\geq 70\%$ C; $\geq 60\%$ D; $\geq 50\%$ E; $< 50\%$ FX.
Learning outcomes: Student should obtain theoretical knowledg	in the knowledge about basic statistical methods and the ability to apply e in practical problems solving.
Brief outline of the c 1. Random vectors (d 2. Covariance, correl 3. Random sample, sa 4. Some important sta 5. Point estimators ar 6. Maximum likeliho 7. Interval estimates, 8. Testing of statistica for searching optimal 9. Some important pa 10. Some important r	bourse: lefinition, distributions, characteristics, joint and marginal distributions). ation and regression. ampling distributions and characteristics. atistics and their distributions. atistics atistics attistics atistics attistics at
Recommended litera 1. Skřivánková V.: Pr 2. Skřivánková VHa 3. Casella, G., Berger 4. DeGroot, M. H., S 5. Anděl J.: Základy	nture: ravdepodobnosť v príkladoch, UPJŠ, Košice, 2006 (in Slovak) ančová M.: Štatistika v príkladoch, UPJŠ, Košice, 2005 (in Slovak) r, R., Statistical Inference, 2nd ed., Duxbury Press, 2002 chervish, M. J.: Probability and Statistics, 4th ed., Pearson, Boston, 2012 matematické statistiky, MatfyzPress, Praha, 2011 (in Czech)
Slovak	
Notes:	

Course assessn	Course assessment					
Total number o	f assessed studen	ts: 174				
А	В	B C D E FX				
25.29	21.84	14.37	18.97	12.07	7.47	
Provides: doc.	Provides: doc. RNDr. Martina Hančová, PhD.					
Date of last modification: 14.04.2022						
Approved: prof. RNDr. Gabriel Semanišin, PhD., prof. RNDr. Ivan Žežula, CSc.						

University: P. J. Šafá	rik University in Košice
Faculty: Faculty of S	cience
Course ID: ÚMV/ MAP/19	Course name: Matrix calculus
Course type, scope a Course type: Lectur Recommended cour Per week: 2 / 2 Per Course method: pre	nd the method: re / Practice rse-load (hours): study period: 28 / 28 esent
Number of ECTS cr	edits: 5
Recommended seme	ster/trimester of the course: 3.
Course level: I.	
Prerequisities: ÚMV	/ALGa/10
Conditions for cours Exam	e completion:
Learning outcomes: Mastering basic kno special matrices.	wledge on matrices, their properties, different matrix decompositions, and
Brief outline of the c 1. Basic concepts of 1 2. Basic concepts of 1 3. Column space and 4. Inverse matrices, c 5. Matrix space and i 6. Generalized inverse 7. Idempotent matrice 8. Determinant of a n 9. Positive semidefin 10. Eigenvalues and 11. Singular decompo	ourse: linear algebra, geometry of vector spaces matrix algebra, special matrices, matrix operations, vectorization of matrices null space of a matrix, rank of a matrix orthogonal and permutation matrices ts geometry e matrices es and projection matrices matrix ite and positive definite matrices eigenvectors of matrices position and matrix norms
Recommended litera 1. Rosa, S., Harman, 2. Strang, G.: Linear 3. Seber, G.A.F.: A m 4. Searle, S.R., Khuri 5. Meyer, C.D.: Matr	R.: Maticová algebra pre štatistiku a analýzu dát, FMFI UK, 2021. Algebra and Learning from Data, Wellesley- Cambridge Press, 2019. natrix handbook for statisticians. John Wiley & Sons, 2008 a, A.I.: Matrix algebra useful for statistics. John Wiley & Sons, 2017. ix Analysis and applied linear algebra. SIAM, 2000
Course language: Slovak and English	
Notes:	

Course assessn	nent				
Total number o	f assessed studen	ts: 22			
А	В	С	D	Е	FX
31.82	9.09	13.64	18.18	22.73	4.55
Provides: prof. RNDr. Ivan Žežula, CSc., doc. RNDr. Daniel Klein, PhD.					
Date of last modification: 14.04.2022					
Approved: prof. RNDr. Gabriel Semanišin, PhD., prof. RNDr. Ivan Žežula, CSc.					

University: P. J.	. Šafárik Univers	sity in Košice				
Faculty: Faculty	y of Science					
Course ID: ÚM BSA/22	ourse ID: ÚMV/ Course name: Methods of data analysis and artificial intelligence SA/22					
Course type, sc Course type: Recommended Per week: Per Course metho	ope and the me d course-load (h r study period: d: present	thod: nours):				
Number of EC	ΓS credits: 4					
Recommended	semester/trime	ster of the cours	e:			
Course level: I.						
Prerequisities: ÚINF/UNS1/15	ÚMV/FRPb/19	and ÚMV/LCO/1	0 and ÚMV/MS	T/19 and ÚINF/U	JSU/19 and	
Conditions for Knowledge and ability to synthe of data analysis	Conditions for course completion: Knowledge and competencies from the profile subjects of the study program, demonstrating the ability to synthesize the acquired knowledge and procedures, and applying them to the problems of data analysis and artificial intelligence.					
Learning outco Evaluation of st	Learning outcomes: Evaluation of student's competences with respect to the profile of the graduate.					
Brief outline of The state exam the following co UNS1/15. 1. Differential c 2. Linear progra and its interpret 3. Random van hypotheses testi 4. Basic princip 5. Basic princip	the course: ination is perfo ourses:ÚMV/FR alculus, integral mming problem ation. riables, their dis ing. les of machine l les of neural net	rmed in a form Pb/19, ÚMV/LC calculus and thei s, solution metho stributions and c earning and its m works and their r	of a debate with O/10, ÚMV/MS' ir applications. ds and complexit characteristics, es ethods. nethods.	n the emphasis of T/19, ÚINF/USU ty, duality in linea stimation theory	on one topic of J/19 and ÚINF/ ar programming and statistical	
Recommended literature:						
Course language: slovak						
Notes:						
Course assessm Total number of	ent f assessed studer	nts: 5				
А	В	С	D	Е	FX	
80.0	20.0	0.0	0.0	0.0	0.0	
Provides:						

Date of last modification: 18.04.2022

University: P. J. Šafárik	University	/ in	Košice
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Faculty: Faculty of Science

Course ID: ÚMV/	Course name: Numerical methods
NUM/19	

Course type, scope and the method: Course type: Lecture / Practice

Recommended course-load (hours): Per week: 2 / 3 **Per study period:** 28 / 42

Course method: present

Number of ECTS credits: 6

Recommended semester/trimester of the course: 6.

Course level: I.

Prerequisities: (ÚMV/MANb/19 or ÚMV/MAN2b/22 or ÚMV/FRPb/19) and (ÚMV/ALG1b/10 or ÚMV/ALG2b/22 or ÚMV/ALG3b/22 or ÚMV/ALG4b/22)

Conditions for course completion:

Form: Lectures and practices using computers. Solving problems and programming algorithms using the computational platform SageMath (including Python, NumPy, SciPy, SymPy, R, Maxima, matplotlib, GAP, FLINT, and many other packages).

Interim assessment (50% of the total assessment): Solving assigned tasks e.g. in the form of implementation of algorithms or their parts, modification of existing codes or use of available packages in solving real problems.

Final examination (50% of the total assessment): It consists of verifying the understanding of the theory taken over and demonstrating the practical skills acquired.

Learning outcomes:

After completing the course, the student will acquire theoretical knowledge and practical skills regarding the principles and implementation of basic numerical algorithms with emphasis on algorithms used in the field of data analysis.

The student should be able to understand and implement numerical algorithms in programming language independently, to be able to modify components of existing algorithms

and also be able to solve (real) problems by selecting an appropriate numerical method with the available effective computational packages.

Brief outline of the course:

1. Basic principles and techniques of numerical analysis - computer implementation and representation of real numbers, numerical vs. symbolic (analytical) calculations, method vs. algorithm, error measurement of numerical solution, conditionality of numerical problems, stability and convergence of numerical algorithms.

2. Solution of nonlinear equations - methods of bisection and simple iteration, the false position method and Newton method, Newton-Raphson method.

3. Numerical differentiation and integration - trapezoidal method, Simpson method, Newton-Cotes formulas.

4. Approximation of functions and smoothing of data, using polynomials, interpolation, splines, kernel methods.

5. Linear systems - Gaussian elimination with and without pivoting, forward and backward substitution, scaled partial pivoting, singularity and perturbation, matrix conditionality, Thomas method, iterative methods - Jacobi, Gauss-Seidel, SOR method, gradient methods - gradient descent, conjugate directions.

6. Eigenvalues and eigenvectors of matrices - estimation of eigenvalues, partial eigenvalue problem (power method and Rayleigh method, Hessenberg shape), complete eigenvalue problem (calculation of dominant eigenvalue, LU, QU, QR - decomposition, Jacobi method), SVD - Singular Matrix Decomposition.

7. Optimization - MLS, Cauchy method of the highest gradient, Newton method, conjugated gradient method of Fletcher-Reeves, Quasi-Newton methods, Regularization of ill-conditioned problems.

Recommended literature:

1. Ackleh, A. S., Allen, E. J., Kearfott, R. B., & Seshaiyer, P. (2009). Classical and Modern Numerical Analysis: Theory, Methods and Practice (1 edition). Boca Raton: Chapman and Hall/CRC.

2. Anastassiou, G. A., & Mezei, R. (2015). Numerical Analysis Using Sage. Springer International Publishing.

3. Cheney, E. W., & Kincaid, D. R. (2012). Numerical Mathematics and Computing (7 edition). Boston, MA: Cengage Learning.

4. O'Leary, D. P. (2008). Scientific Computing with Case Studies. Philadelphia: Society for Industrial and Applied Mathematics.

5. Sauer, T. (2017). Numerical Analysis. (3 edition). Hoboken, NJ? Pearson.

6. Segethová, J. (2002). Základy numerické matematiky. Karolinum.

7. M. Vicher (2003). Numerická matematika.

Course language:

Slovak

Notes:

Course assessment

Total number of assessed students: 138

А	В	С	D	Е	FX
13.77	16.67	7.25	14.49	35.51	12.32

Provides: RNDr. Andrej Gajdoš, PhD.

Date of last modification: 18.04.2022

University: P. J. Šafá	rik University in Košice
Faculty: Faculty of S	Science
Course ID: ÚINF/ PBS/15	Course name: Pro-seminar to bachelor thesis
Course type, scope a Course type: Practi Recommended cou Per week: 1 Per stu Course method: pr	and the method: ce rse-load (hours): ady period: 14 esent
Number of ECTS cr	redits: 1
Recommended seme	ester/trimester of the course: 4.
Course level: I.	
Prerequisities:	
Conditions for cour Creating a website at bachelor's thesis assi motivation to select a into the AIS by the t	se completion: bout a bachelor's thesis. Selection of bachelor thesis topic. Presentation of the gnment and its objectives. Preparation of an essay in the extent of 1 page on the bachelor's thesis. Creation of the bachelor's thesis assignment and its insertion hesis supervisor.
Learning outcomes: Basic knowledge of requirements for sele the bachelor's thesis	' the principles of creation and structure of bachelor's theses. Criteria and ecting an appropriate bachelor thesis topic. Knowledge about the structure of assignment.
Brief outline of the o 1. Principles in creat 2. The presentations 3. The presentations 4. The presentations 5. Bachelor thesis and 6. Assignment of bac 7. Basic types of bac 8. Structure of differ 9. Requirements for 10. External compan 11. Presentation of so 12. Presentation of so 13. Presentation of so	course: ing a final thesis. of bachelor thesis topics by potential supervisors. of bachelor thesis topics by potential supervisors. of bachelor thesis topics by potential supervisors. d its objectives. chelor thesis. helor theses. ent types of bachelor theses. final bachelor theses. y final theses. elected topics of final theses. elected topics of final theses. elected topics of final theses.
Recommended liter 1. STN 01 6910. Rul 2. STN ISO 2145. D 1997. 3. STN ISO 690. Inferences to informa 4. KATUŠČÁK, Dar	ature: es of writing and editing documents. 2011. ocumentation. Numbering of sections and subsections of written documents. formation and documentation. Instructions for creating bibliographic ation sources and their citation. 2012 hiel. How to write final and qualification theses. Enigma, 2013

5. Scientific literature related to the topic of the final thesis according to the recommendation of the thesis supervisor.

Course language: Slovak or English	
Notes:	
Course assessment Total number of assessed students: 356	
abs	n
94.94	5.06
Provides: doc. RNDr. Ľubomír Antoni, PhD.	
Date of last modification: 08.01.2022	
Approved: prof. RNDr. Gabriel Semanišin, PhD.	, prof. RNDr. Ivan Žežula, CSc.

University: P. J. Šafárik University in Košice				
Faculty: Faculty of Science				
Course ID: ÚMV/ TPP/19Course name: Probability theory				
Course type, scope and the method: Course type: Lecture / Practice Recommended course-load (hours): Per week: 2 / 2 Per study period: 28 / 28 Course method: present				
Number of ECTS credits: 5				
Recommended semester/trimester of the course: 4.				
Course level: I.				
Prerequisities: ÚMV/MAN1c/22 or ÚMV/MAN2c/22 or ÚMV/FRPa/19				
Conditions for course completion: To obtain at least 50% in two written tests during the semester. Total evaluation based on written tests and oral exam.				
Learning outcomes: To obtain knowledge of the axiomatic theory of probability, random variables and their characteristics, special types of distributions and their applications.				
 Brief outline of the course: 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, chi-square, Student, Fisher). Central limit theorem. 				
 Recommended literature: 1. Skřivánková V.: Pravdepodobnosť v príkladoch, UPJŠ, Košice, 2006 (in Slovak) 2. DeGroot, M. H., Schervish, M. J.: Probability and Statistics, 4th ed., Pearson, Boston, 2012 3. Evans, M. J., Rosenthal, J. S.: Probability and Statistics: The Science of Uncertainty, 2nd Ed., W. H. Freeman, 2009 4. Riečan et al.: Pravdepodobnosť a matematická štatistika, Alfa, Bratislava, 1984 (in Slovak) 5. Potocký a kol.: Zbierka úloh z pravdepodobnosti a matematickej štatistiky, Alfa, Bratislava, 1991 				
Course language: Slovak				
Notes:				

Course assessn	nent	. 200			
Total number o	i assessed studen	ts: 360			
Α	В	С	D	E	FX
14.44	13.89	17.22	21.67	25.56	7.22
Provides: doc. RNDr. Daniel Klein, PhD., RNDr. Andrej Gajdoš, PhD.					
Date of last modification: 27.01.2022					
Approved: prof. RNDr. Gabriel Semanišin, PhD., prof. RNDr. Ivan Žežula, CSc.					

University: P. J. Šafárik Unive	ersity in Košice
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Faculty: Faculty of Science

Course ID: ÚINF/	Course name: Proces modelling
PMO1/15	

Course type, scope and the method:

Course type: Lecture / Practice

Recommended course-load (hours): Per week: 2 / 2 **Per study period:** 28 / 28

Course method: present

Number of ECTS credits: 5

Recommended semester/trimester of the course: 6.

Course level: I., N

Prerequisities: ÚINF/PAZ1b/15 and ÚINF/DBS1a/15 and ÚINF/SWI1a/15

Conditions for course completion:

The interim evaluation is based on the evaluation of partial tasks within the solution of the semester project.

The final assessment is given on the basis of the interim assessment and the result of the exam. On the exam, it is required to prove the ability to orient oneself in the presented issue, to master the theoretical foundations of process modeling, basic skills for the creation and interpretation of process models.

The evaluation is awarded if the student gets at least 50% of the possible points from each part of the exam. Detailed requirements are given in the AIS.

Learning outcomes:

By completing the subject, the student:

- acquires knowledge about the theoretical starting points and basics of process modeling,
- can master the basic principles of creating process models
- get familiar with standard languages for process modeling

- will gain practical experience in creating models using selected modeling tools.

Brief outline of the course:

- 1. Introduction to process modeling.
- 2. Development of approaches to the development of large software systems.
- 3. Theoretical foundations of process modeling.
- 4. Petri nets.
- 5. Process orchestration.
- 6. Choreography of processes.
- 7. Selected properties of processes and process models.
- 8. Architectures of process models.
- 9. Methodologies and standards.

Recommended literature:

1. Ehrig, H.; Juhas, G.; Padberg, J.; Rozenberg, G. (Eds.), Advances in Petri Nets, Lecture Notes in Computer Science, Vol. 2128 (2001)

2. Eshuis, R. ; Wieringa R.: Comparing Petri Net and Activity Diagram Variants for Workflow Modelling – A Quest for Reactive Petri Nets, [dostupné online http://is.tm.tue.nl/staff/heshuis/pnt.pdf]

3. Madison D., Process Mapping, Process Improvement and Process Management, Paton Press 2005

4. Weske, M. Business Process Management, Springer 2007

5. White S.A., Miers D., Fischer L., BPMN Modeling and Reference Guide, Future Strategies Inc., Lighthouse Pt 2008

6. White:, S.A. Process Modeling Notations and Workflow Patterns, [available online http://www.omg.org/bp-corner/bp-files/Process_Modeling_Notations.pdf]

Course language:

Slovak or English

Notes:

Content prerequisities: programming, bases of software engineering and database management systems, bases of project management

Course assessment

Total number of assessed students: 57

А	В	С	D	Е	FX
15.79	22.81	28.07	19.3	8.77	5.26

Provides: prof. RNDr. Gabriel Semanišin, PhD.

Date of last modification: 25.07.2022

University: P. J. Šafárik University in Košice				
Faculty: Faculty of Science				
Course ID: ÚINF/ PAZ1a/15	Course name: Programming, algorithms, and complexity			
Course type, scope a Course type: Lectur Recommended cour Per week: 3 / 4 Per Course method: pre	nd the method: re / Practice rse-load (hours): study period: 42 / 56 esent			
Number of ECTS cr	edits: 8			
Recommended seme	ster/trimester of the course: 1.			
Course level: I.				
Prerequisities:				
Conditions for cours Graded activities dur Final examination: pr Rules to pass the subj final project) and tes defined limit of total	e completion: ing semester: assignments, small exams, midterm, final project. cactical finalterm focused on a complex task. ect: Pass the minimal limit of points for category of homeworks (assignments, ts (small exams, midterm). Get at least 42% from the finalterm and pass the points for all graded activities.			
Learning outcomes: Get an ability to imploriented programmin	ement basic Java programs and obtain essential knowledge related to object- g.			
Brief outline of the c 1. Introduction to Jav objects using turtle g 2. For-loops, local van conditions. 3. While-loop, return	ourse: a and JPAZ2 framework, first Eclipse project, interactive communication with raphics, repeating code in loops, notion of class, object, and method. riables, variable types, arithmetic expressions, random numbers, random walk, ing a value from a method, reference and reference variables, debugging.			
 4. Primitive and reference types, chars, String objects (including basic algorithms), mouse events, instance variables. 5 Array of primitive values and array of references simple array algorithms 				
6. Advanced array al 7. Exceptions and exe 8. Reading from text	gorithms, two-dimensional array. ception handling, files and directories, writing to text files.			
9. Creating classes, overloading.	encapsulation, getters and setters, constructors and their hierarchy, method			
10. Inheritance and p 11. Java Collections autoboxing, interface 12. Access modifiers static methods and va	olymorphism. s Framework, ArrayList class, wrapper classes for primitive types and s List, Set, Map and their implementations, methods equals and hashCode. , abstract classes and methods, creating and implementing interfaces, sorting, miables.			
13. Creating and thro	wing exceptions, checked and runtime exceptions, JavaDoc, Maven.			
Recommended litera	iture:			

Recommended literature:

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: 891

А	В	С	D	Е	FX
16.16	8.53	11.78	18.29	13.8	31.43

Provides: RNDr. Juraj Šebej, PhD., RNDr. Miroslav Opiela, PhD., RNDr. Zoltán Szoplák, RNDr. Viktor Pristaš, doc. RNDr. Ondrej Krídlo, PhD., RNDr. Richard Staňa, Mgr. Viktor Olejár

Date of last modification: 04.01.2022

Faculty: Faculty of Science

Course ID: ÚINF/	Course name: Programming, algorithms, and complexity
PAZ1b/15	

Course type, scope and the method:

Course type: Lecture / Practice

Recommended course-load (hours): Per week: 2 / 4 **Per study period:** 28 / 56

Course method: present

Number of ECTS credits: 7

Recommended semester/trimester of the course: 2.

Course level: I.

Prerequisities: ÚINF/PAZ1a/15

Conditions for course completion:

Graded activities during semester: assignments, small theoretical exams, practical and theoretical midterm.

Final examination: practical and theoretical finalterm.

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). Pass the defined limit of total points for all graded activities.

Learning outcomes:

To know essential algorithms, data structures, and methods used for efficient algorithms design. To understand time complexity analysis. To practice efficient implementation of algorithms. To recognize combinatorial and graph algorithms.

Brief outline of the course:

- 1. Recursion and fractals.
- 2. Binary search, basic sorting algorithms, time complexity analysis, O-notation.
- 3. Basic data structures and algorithms: linked list, stack, queue.
- 4. Trees and their applications.
- 5. Efficient sorting algorithms (QuickSort, MergeSort, HeapSort).
- 6. Backtracking.
- 7. Dynamic programming, divide and conquer strategy.
- 8. Unweighted graphs, graph traversal, graph topological sort.
- 9. Weighted graphs, the shortest path algorithms.
- 10. Minimum spanning tree, greedy algorithms.
- 11. Hashing, amortized time complexity, string-searching algorithms.

Recommended literature:

1. WRÓBLEWSKI, Piotr. Algoritmy: datové struktury a programovací techniky. Brno: Computer Press, 2004. ISBN 80-251-0343-9.

2. CORMEN, Thomas H. Introduction to algorithms. 3rd ed. Cambridge: MIT Press, c2009. ISBN 978-0-262-03384-8.

3. KLEINBERG, Jon a Éva TARDOS. Algorithm design. Thirteenth impression. Noida, India: Pearson, c2014. ISBN 9789332518643.

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: 1308

А	В	С	D	Е	FX
14.3	7.8	10.86	19.04	20.8	27.22

Provides: RNDr. Juraj Šebej, PhD., RNDr. Miroslav Opiela, PhD., RNDr. Viktor Pristaš, doc. RNDr. Ondrej Krídlo, PhD.

Date of last modification: 04.01.2022

University: P. J.	University: P. J. Šafárik University in Košice				
Faculty: Faculty	of Science				
Course ID: ÚM PDAb/19	V/ Course name: Project of data analysis II				
Course type, scope and the method: Course type: Practice Recommended course-load (hours): Per week: 3 Per study period: 42 Course method: present					
Number of ECT	S credits: 3			_	
Recommended s	emester/trimes	ster of the cours	e: 5.		
Course level: I.					
Prerequisities:					
Conditions for c Activity at the pr for the considere	ourse completi actise session. I d problem.	on: Homeworks. Pre	sentation of appli	ied methods and	obtained results
Learning outcomes: Become familiar with handling a complex data problem which consist of data management, data analysis, method proposal for the considered problem and its following implementation for the given data.					
Brief outline of the course: Individual work or work in groups on real applied problems. Data analysis - variables structure, classification, missing values, outliers. Suggested solutions based on classical statistical approach, solutions based on machine learning and neural networks.					
Recommended literature: James, Gareth, et al. An introduction to statistical learning. Vol. 112. New York: Springer, 2013. Efron, Bradley, and Trevor Hastie. Computer age statistical inference. Vol. 5. Cambridge University Press, 2016. Raschka, Sebastian, and Vahid Mirjalili. Python machine learning. Packt Publishing Ltd, 2017. VanderPlas, Jake. Python data science handbook: essential tools for working with data. " O'Reilly Media, Inc.", 2016. Study literature related to the suggested project.					
Course language: Slovak or english.					
Notes:					
Course assessment Total number of assessed students: 12					
A	В	С	D	Е	FX
100.0	0.0	0.0	0.0	0.0	0.0
Provides: Mgr. Katarína Lučivjanská, PhD., doc. RNDr. Ľubomír Antoni, PhD.					

Date of last modification: 26.03.2019

University: P. J. Šafárik University in Košice				
Faculty: Faculty of Science				
Course ID: ÚTVŠ/ Course name: Seaside Aerobic Exercise ÚTVŠ/CM/13				
Course type, scope and the method: Course type: Practice Recommended course-load (hours): Per week: 2 Per study period: 28 Course method: present				
Number of ECTS credits: 2				
Recommended semester/trimester of the course:				
Course level: I., II.				
Prerequisities:				
Conditions for course completion: Completion: passed Condition for successful course completion: - active participation in line with the study rule of procedure and course guidelines - effective performance of all tasks- aerobics, water exercise, yoga, Pilates and others				
Learning outcomes: Content standard: The student demonstrates relevant knowledge and skills in the field, which content is defined in the course syllabus and recommended literature. Performance standard: Upon completion of the course students are able to meet the performance standard and: - perform basic aerobics steps and basics of health exercises, - conduct verbal and non-verbal communication with clients during exercise, - organise and manage the process of physical recreation in leisure time				
 Brief outline of the course: Brief outline of the course: 1. Basic aerobics – low impact aerobics, high impact aerobics, basic steps and cuing 2. Basics of aqua fitness 3. Basics of Pilates 4. Health exercises 5. Bodyweight exercises 6. Swimming 7. Relaxing yoga exercises 8. Power yoga 9. Yoga relaxation 10. Final assessment Students can engage in different sport activities offered by the sea resort – swimming, rafting, volleyball, football, table tennis, tennis and other water sports in particular. 				
Recommended literature: 1. BUZKOVÁ, K. 2006. Fitness jóga. Praha: Grada. 167 s.				

 ŽECHOVSKÁ, I., MILEROVÁ, H., NOVOTNÁ, V. Aqua-fitness. Praha: Grada. 136 s. EVANS, M., HUDSON, J., TUCKER, P. 2001. Umění harmonie: meditace, jóga, tai-či, strečink. 192 s. JARKOVSKÁ, H., JARKOVSKÁ, M. 2005. Posilováni s vlastním tělem 417 krát jinak. Praha: Grada. 209 s. KOVAŘÍKOVÁ, K. 2017. Aerobik a fitness. Karolium, 130 s. 			
Course language: Slovak language			
Notes:			
Course assessment Total number of assessed students: 54			
abs	n		
11.11	88.89		
Provides: Mgr. Agata Dorota Horbacz, PhD.			
Date of last modification: 29.03.2022			
Approved: prof. RNDr. Gabriel Semanišin, PhD., prof. RNDr. Ivan Žežula, CSc.			

University: P. J. Šafá	rik University in Košice				
Faculty: Faculty of Science					
Course ID: ÚINF/ SZPa/22	ourse ID: ÚINF/ ZPa/22Course name: Special seminar to bachelor thesis				
Course type, scope a Course type: Practic Recommended cou Per week: 1 Per stu Course method: pre	Course type, scope and the method: Course type: Practice Recommended course-load (hours): Per week: 1 Per study period: 14 Course method: present				
Number of ECTS cr	edits: 1				
Recommended seme	ster/trimester of the course: 5.				
Course level: I.					
Prerequisities:					
Conditions for cours Update of the bachel selected in the bache scientific article of 5 supervisor.	e completion: or thesis website. Presentation of the current state of knowledge for the topic elor's thesis. Presentation of the first results of bachelor thesis. Preparing of pages length in the required structure. Approval of the article by the thesis				
Learning outcomes: Basic knowledge abo aspects of the bachelo creating the database of the current state of preparation of a scien	but the procedure and writing of the bachelor's thesis, standards and formal or's thesis, the creation of bibliographic references and their citations, tools for a of used literature. Basic knowledge of the content and form of presentation of knowledge for the topic of the bachelor's thesis. Basic knowledge about the ntific article.				
 Brief outline of the course: Procedure for writing the bachelor thesis. Standards and formal aspects of the bachelor thesis. Rules of writing and editing documents STN 01 6910. Documentation, Numbering of sections and subsections of written documents STN ISO 2145. Information and documentation STN ISO 690. Instructions for creating bibliographic references to information sources and their citation. Selected typographic principles. Professional resources on the Internet. Principles of correct citation. Tools for creating your own database of used literature. Annotation of read literature, creation of searches. Presentation of selected topics of bachelor theses. 					
Recommended litera 1. STN 01 6910. Rul 2. STN ISO 2145. Do 1997.	iture: es of writing and editing documents. 2011. ocumentation. Numbering of sections and subsections of written documents.				
3. STN ISO 690. Information and documentation. Instructions for creating bibliographic references to information sources and their citation. 2012

4. KATUŠČÁK, Dušan. How to write final and qualification theses. Enigma, 2013

5. Scientific literature related to the topic of the final thesis according to the recommendation of the thesis supervisor.

Course language: Slovak or English						
Notes:	Notes:					
Course assessment Total number of assessed studen	ts: 166					
abs	n	neabs				
98.8	1.2	0.0				
Provides: doc. RNDr. Ľubomír Antoni, PhD.						
Date of last modification: 08.01	.2022					
Approved: prof. RNDr. Gabriel	Semanišin, PhD., prof. RNDr. I	van Žežula, CSc.				

University: P. J. Šafá	rik University in Košice
Faculty: Faculty of S	cience
Course ID: ÚINF/ SZPb/22	Course name: Special seminar to bachelor thesis
Course type, scope a Course type: Practic Recommended cou Per week: 1 Per stu Course method: pre	nd the method: ce rse-load (hours): idy period: 14 esent
Number of ECTS cr	edits: 1
Recommended seme	ster/trimester of the course: 6.
Course level: I.	
Prerequisities:	
Conditions for cours Update of the bachel Preparation of at leas required structure and about the results of the	Se completion: or thesis website. Presentation of the obtained results of the bachelor's thesis. t a 10-page scientific article for the topic chosen in the bachelor's thesis in the d its approval by the thesis supervisor. Creating a promotional image (poster) ne bachelor's thesis.
Learning outcomes: Basic knowledge of of presentation of the the preparation of a purposes.	the central register of final theses, licenses and copyrights, content and form he overall results achieved in the bachelor's thesis. Basic knowledge about scientific article and presentation of the achieved results for popularization
Brief outline of the c 1. Central register of 2. Licenses and Copy 3. Directive on basic 4. The most common 5. Evaluation criteria 6. Preparation of a pr 7. Preparation of a pr 9. Preparation of a sc 10. Procedure for sub 11. Popularization of 12. Presentations of t	ourse: final theses. rrights. requirements for final theses at UPJŠ in Košice. mistakes in writing a final thesis. and examples of assessments. resentation for the defense of the final thesis. resentation for the defense of the final thesis.
Recommended litera 1. STN 01 6910. Rul 2. STN ISO 2145. Do 1997	iture: es of writing and editing documents. 2011. ocumentation. Numbering of sections and subsections of written documents.

3. STN ISO 690. Information and documentation. Instructions for creating bibliographic references to information sources and their citation. 2012

4. KATUŠČÁK, Dušan. How to write final and qualification theses. Enigma, 2013

5. Scientific literature related to the topic of the final thesis according to the recommendation of the thesis supervisor.

Course language:

Slovak or English

Notes:

Course assessment

Total number of assessed students: 165

abs	n	neabs
98.79	1.21	0.0

Provides: doc. RNDr. L'ubomír Antoni, PhD.

Date of last modification: 08.01.2022

University: P. J. Šafárik	University in Košice
Faculty: Faculty of Scien	nce
Course ID: ÚTVŠ/ Co TVa/11	ourse name: Sports Activities I.
Course type, scope and Course type: Practice Recommended course- Per week: 2 Per study Course method: preser	the method: -load (hours): period: 28 nt
Number of ECTS credi	ts: 2
Recommended semester	r/trimester of the course: 1.
Course level: I., II.	
Prerequisities:	
Conditions for course c Min. 80% of active parti	ompletion: cipation in classes.
Learning outcomes: Sports activities in all the They have a great impace enables students to stree improve.	Fir forms prepare university students for their professional and personal life. et on physical fitness and performance. Specialization in sports activities ngthen their relationship towards the selected sport in which they also
Brief outline of the cours Brief outline of the cours The Institute of physical activities aerobics; aikid yoga, power yoga, pilat tennis, chess, volleyball, Additionally, the Institu offers winter courses (sl the Tisza River) with an participation.	rse: se: education and sport at the Pavol Jozef Šafárik University offers 20 sports o, basketball, badminton, body-balance, body form, bouldering, floorball, es, swimming, fitness, indoor football, SM system, step aerobics, table tabata, cycling. te of physical education and sport at the Pavol Jozef Šafárik University ki course, survival) and summer courses (aerobics by the sea, rafting on attractive programme, sports competitions with national and international
Recommended literatur BENCE, M. et al. 2005. [online] Dostupné na: ht BUZKOVÁ, K. 2006. F 8024715252. JARKOVSKÁ, H, JARH Grada. ISBN 978802475 KAČÁNI, L. 2002. Futb 8089197027. KRESTA, J. 2009. Futsa LAWRENCE, G. 2019. SNER, Wolfgang. 2004.	 Plávanie. Banská Bystrica: FHV UMB. 198s. ISBN 80-8083-140-8. tps://www.ff.umb.sk/app/cmsFile.php?disposition=a&ID=571 itness jóga, harmonické cvičení těla I duše. Praha: Grada. ISBN KOVSKÁ, M. 2005. Posilování s vlastním tělem 417 krát jinak. Praha: 67308. al:Tréning hrou. Bratislava: Peter Mačura – PEEM. 278s. ISBN I.Praha: Grada Publishing, a.s. 112s. ISBN 9788024725345. Power jóga nejen pro sportovce. Brno: CPress. ISBN 9788026427902. Posilování ve fitness. České Budějovice: Kopp. ISBN 8072322141.

VOMÁČKO, S. BOŠTÍKOVÁ, S. 2003. Lezení na umělých stěnách. Praha: Grada. 129s. ISBN 8024721743.

Course language:

Slovak language

Notes:

Course assessment

Total number of assessed students: 15193

abs	abs-A	abs-B	abs-C	abs-D	abs-E	n	neabs
86.05	0.07	0.0	0.0	0.0	0.05	8.69	5.15

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

Date of last modification: 07.02.2024

University: P. J. Šafán	rik University in Košice
Faculty: Faculty of Security	cience
Course ID: ÚTVŠ/ TVb/11	Course name: Sports Activities II.
Course type, scope and Course type: Practic Recommended cour Per week: 2 Per stud Course method: pre	nd the method: ce rse-load (hours): dy period: 28 esent
Number of ECTS cro	edits: 2
Recommended semes	ster/trimester of the course: 2.
Course level: I., II.	
Prerequisities:	
Conditions for cours active participation in	e completion: a classes - min. 80%.
Learning outcomes: Sports activities in all They have a great im enables students to s improve.	their forms prepare university students for their professional and personal life. spact on physical fitness and performance. Specialization in sports activities strengthen their relationship towards the selected sport in which they also
Brief outline of the co Brief outline of the co The Institute of physi activities aerobics; ail yoga, power yoga, p tennis, chess, volleyb Additionally, the Inst offers winter courses the Tisza River) with participation.	Durse: Durse: cal education and sport at the Pavol Jozef Šafárik University offers 20 sports kido, basketball, badminton, body-balance, body form, bouldering, floorball, ilates, swimming, fitness, indoor football, SM system, step aerobics, table all, tabata, cycling. titute of physical education and sport at the Pavol Jozef Šafárik University (ski course, survival) and summer courses (aerobics by the sea, rafting on an attractive programme, sports competitions with national and international
Recommended litera BENCE, M. et al. 200 [online] Dostupné na: BUZKOVÁ, K. 2006 8024715252. JARKOVSKÁ, H, JA Grada. ISBN 9788024 KAČÁNI, L. 2002. F 8089197027. KRESTA, J. 2009. Fu LAWRENCE, G. 201 SNER, Wolfgang. 200	 ture: D5. Plávanie. Banská Bystrica: FHV UMB. 198s. ISBN 80-8083-140-8. https://www.ff.umb.sk/app/cmsFile.php?disposition=a&ID=571 Fitness jóga, harmonické cvičení těla I duše. Praha: Grada. ISBN IRKOVSKÁ, M. 2005. Posilování s vlastním tělem 417 krát jinak. Praha: 4757308. utbal:Tréning hrou. Bratislava: Peter Mačura – PEEM. 278s. ISBN itsal.Praha: Grada Publishing, a.s. 112s. ISBN 9788024725345. Power jóga nejen pro sportovce. Brno: CPress. ISBN 9788026427902. Posilování ve fitness. České Budějovice: Kopp. ISBN 8072322141.

VOMÁČKO, S. BOŠTÍKOVÁ, S. 2003. Lezení na umělých stěnách. Praha: Grada. 129s. ISBN 8024721743.

Course language:

Slovak language

Notes:

Course assessment

Total number of assessed students: 13318

abs	abs-A	abs-B	abs-C	abs-D	abs-E	n	neabs
84.37	0.51	0.02	0.0	0.0	0.05	10.78	4.28

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

Date of last modification: 07.02.2024

University: P. J. Šafán	ik University in Košice
Faculty: Faculty of Seculty of Seculty	cience
Course ID: ÚTVŠ/ TVc/11	Course name: Sports Activities III.
Course type, scope an Course type: Practic Recommended cour Per week: 2 Per stue Course method: pre	nd the method: se se-load (hours): dy period: 28 sent
Number of ECTS cro	edits: 2
Recommended semes	ster/trimester of the course: 3.
Course level: I., II.	
Prerequisities:	
Conditions for cours min. 80% of active pa	e completion: articipation in classes
Learning outcomes: Sports activities in all They have a great im enables students to s improve.	their forms prepare university students for their professional and personal life. pact on physical fitness and performance. Specialization in sports activities trengthen their relationship towards the selected sport in which they also
Brief outline of the co Brief outline of the co The Institute of physi activities aerobics; ail yoga, power yoga, p tennis, chess, volleyb Additionally, the Inst offers winter courses the Tisza River) with participation.	burse: burse: cal education and sport at the Pavol Jozef Šafárik University offers 20 sports cido, basketball, badminton, body-balance, body form, bouldering, floorball, ilates, swimming, fitness, indoor football, SM system, step aerobics, table all, tabata, cycling. itute of physical education and sport at the Pavol Jozef Šafárik University (ski course, survival) and summer courses (aerobics by the sea, rafting on an attractive programme, sports competitions with national and international
Recommended litera BENCE, M. et al. 200 [online] Dostupné na: BUZKOVÁ, K. 2006 8024715252. JARKOVSKÁ, H, JA Grada. ISBN 9788024 KAČÁNI, L. 2002. F 8089197027. KRESTA, J. 2009. Fu LAWRENCE, G. 201 SNER, Wolfgang. 200	 ture: b) Diversional Structure b) Diversional Structure b) Diversional Structure c) Diversional S

VOMÁČKO, S. BOŠTÍKOVÁ, S. 2003. Lezení na umělých stěnách. Praha: Grada. 129s. ISBN 8024721743.

Course language:

Slovak language

Notes:

Course assessment

Total number of assessed students: 9100

abs	abs-A	abs-B	abs-C	abs-D	abs-E	n	neabs
88.37	0.07	0.01	0.0	0.0	0.02	4.46	7.07

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

Date of last modification: 07.02.2024

University: P. J. Šafá	rik University in Košice
Faculty: Faculty of S	cience
Course ID: ÚTVŠ/ TVd/11	Course name: Sports Activities IV.
Course type, scope a Course type: Practic Recommended cour Per week: 2 Per stu Course method: pre	nd the method: ce rse-load (hours): dy period: 28 esent
Number of ECTS cro	edits: 2
Recommended seme	ster/trimester of the course: 4.
Course level: I., II.	
Prerequisities:	
Conditions for cours min. 80% of active pa	e completion: articipation in classes
Learning outcomes: Sports activities in all They have a great im enables students to s improve.	their forms prepare university students for their professional and personal life. apact on physical fitness and performance. Specialization in sports activities strengthen their relationship towards the selected sport in which they also
Brief outline of the c Brief outline of the c The Institute of physi activities aerobics; ai yoga, power yoga, p tennis, chess, volleyb Additionally, the Inst offers winter courses the Tisza River) with participation.	ourse: burse: ical education and sport at the Pavol Jozef Šafárik University offers 20 sports kido, basketball, badminton, body-balance, body form, bouldering, floorball, ilates, swimming, fitness, indoor football, SM system, step aerobics, table all, tabata, cycling. titute of physical education and sport at the Pavol Jozef Šafárik University (ski course, survival) and summer courses (aerobics by the sea, rafting on an attractive programme, sports competitions with national and international
Recommended litera BENCE, M. et al. 200 [online] Dostupné na BUZKOVÁ, K. 2006 8024715252. JARKOVSKÁ, H, JA Grada. ISBN 978802 KAČÁNI, L. 2002. F 8089197027. KRESTA, J. 2009. Fu LAWRENCE, G. 201 SNER, Wolfgang. 20	 Ature: O5. Plávanie. Banská Bystrica: FHV UMB. 198s. ISBN 80-8083-140-8. https://www.ff.umb.sk/app/cmsFile.php?disposition=a&ID=571 Fitness jóga, harmonické cvičení těla I duše. Praha: Grada. ISBN ARKOVSKÁ, M. 2005. Posilování s vlastním tělem 417 krát jinak. Praha: 4757308. Tutbal:Tréning hrou. Bratislava: Peter Mačura – PEEM. 278s. ISBN Atsal.Praha: Grada Publishing, a.s. 112s. ISBN 9788024725345. Power jóga nejen pro sportovce. Brno: CPress. ISBN 9788026427902. Posilování ve fitness. České Budějovice: Kopp. ISBN 8072322141.

VOMÁČKO, S. BOŠTÍKOVÁ, S. 2003. Lezení na umělých stěnách. Praha: Grada. 129s. ISBN 8024721743.

Course language:

Slovak language

Notes:

Course assessment

Total number of assessed students: 5671

abs	abs-A	abs-B	abs-C	abs-D	abs-E	n	neabs
82.81	0.28	0.04	0.0	0.0	0.0	7.97	8.9

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

Date of last modification: 07.02.2024

X	
University: P. J. Safái	ik University in Košice
Faculty: Faculty of S	cience
Course ID: ÚTVŠ/ LKSp/13	Course name: Summer Course-Rafting of TISA River
Course type, scope a Course type: Practic Recommended cour Per week: 2 Per stu Course method: pre	nd the method: se se-load (hours): dy period: 28 sent
Number of ECTS cro	edits: 2
Recommended seme	ster/trimester of the course:
Course level: I., II.	
Prerequisities:	
Conditions for cours Completion: passed Condition for success - active participation - effective performance paddling	e completion: ful course completion: in line with the study rule of procedure and course guidelines ce of all tasks: carrying a canoe, entering and exiting a canoe, righting a canoe,
Learning outcomes: Content standard: The student demonstr course syllabus and re Performance standard Upon completion of t - implement the acqui - implement basic ski - determine the right s - prepare a suitable m	ates relevant knowledge and skills in the field, which content is defined in the ecommended literature. I: the course students are able to meet the performance standard and: ired knowledge in different situations and practice, lls to manipulate a canoe on a waterway, spot for camping, aterial and equipment for camping.
Brief outline of the constraints of the constraints of the constraint of the constraints of the constraint of the constraints. Setting up a crew 4. Practical skills traints 5. Canoe lifting and constraints of the canoe lifting the canoe in the canoe in the canoe in the canoe of the pry stroke (on b) The draw stroke in the canoe of the canoe	burse: purse: iculty of waterways ting ning using an empty canoe arrying n the water without a shore contact e ut of the water fast waterways)

11. Capsizing	
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12. Commands

Recommended literature:

1. JUNGER, J. et al. Turistika a športy v prírode. Prešov: FHPV PU v Prešove. 2002. ISBN 8080680973.

Internetové zdroje:

1. STEJSKAL, T. Vodná turistika. Prešov: PU v Prešove. 1999.

Dostupné na: https://ulozto.sk/tamhle/UkyxQ2lYF8qh/name/Nahrane-7-5-2021-v-14-46-39#! ZGDjBGR2AQtkAzVkAzLkLJWuLwWxZ2ukBRLjnGqSomICMmOyZN==

Course language:

Slovak language

Notes:

Course assessment

Total number of assessed students: 209

abs	n
37.32	62.68

Provides: Mgr. Dávid Kaško, PhD.

Date of last modification: 29.03.2022

University: P. J. Šafár	ik University in Košice					
Faculty: Faculty of Science						
Course ID: ÚTVŠ/ KP/12	Course name: Survival Course					
Course type, scope an Course type: Practic Recommended cour Per week: 2 Per stue Course method: pres	nd the method: e se-load (hours): hy period: 28 sent					
Number of ECTS cre	edits: 2					
Recommended semes	ster/trimester of the course:					
Course level: I., II.						
Prerequisities:						
Conditions for course Completion: passed Condition for success - active participation if - effective performance Learning outcomes: Content standard: The student demonstration course syllabus and rec Performance standard Upon completion of th - acquire knowledge a - obtain theoretical kn connected with survive - be able to resist ar	ful course completion: n line with the study rule of procedure and course guidelines, e of all the tasks defined in the course syllabus ates relevant knowledge and skills in the field, which content is defined in the ecommended literature. : he course students are able to meet the performance standard and should: bout safe stay and movement in natural environment, owledge and practical skills to solve extraordinary and demanding situations and minimization of damage to health, and face situations related to overcoming barriers and obstacles in natural					
environment, - be able implement children and youth wi	the acquired knowledge as an instructor during summer sport camps for thin recreational sport.					
 Brief outline of the constraints Brief outline of the constraints Brinciples of condunation Preparation and guidation Objective and subject Principles of hygicant Fire building Movement in the unit Shelters Food preparation and Rappelling, Tyroliant Transport of an interval 	Durse: urse: ct and safety in the movement in unfamiliar natural environment dance of a hike tour ective danger in the mountains ne and prevention of damage to health in extreme conditions nfamiliar terrain, orientation and navigation nd water filtering n traverse jured person, first aid					

Recommended literature:

1. JUNGER, J. et al. Turistika a športy v prírode. Prešov: Fakulta humanitných a prírodných vied PU v Prešove. 2002. 267s. ISBN 80-8068-097-3.

PAVLÍČEK, J. Člověk v drsné přírodě. 3. vyd. Praha: Práh. 2002. ISBN 8072520598.
 WISEMAN, J. SAS: příručka jak přežít. Praha: Svojtka & Co. 2004. 566s. ISBN 8072372807.

Course language:

Slovak language

Notes:

Course assessment

Total number of assessed students: 439

abs 46.01

n

53.99

Provides: Mgr. Ladislav Kručanica, PhD.

Date of last modification: 16.05.2023

University: P. J. Šafá	rik University in Košice
Faculty: Faculty of S	cience
Course ID: ÚINF/ SLO1a/15	Course name: Symbolic logic
Course type, scope a Course type: Lectur Recommended cour Per week: 2 / 1 Per Course method: pre	nd the method: re / Practice rse-load (hours): study period: 28 / 14 esent
Number of ECTS cro	edits: 5
Recommended seme	ster/trimester of the course: 4.
Course level: I.	
Prerequisities:	
Conditions for cours Knowledge of studied	e completion: d notions will be evaluated.
Learning outcomes: To understand basic r	notions of symbolic logic.
 Brief outline of the c 1. Mathematical symple 2. Expressions 3. Interpretation 4. Value of expression 5. Standard interpretation 6. Theories and their 7. Substitutions 8. Allowed substitutions 9. Proving system 10. Correctness of ba 11. Work with logication 12. Work with quantiantical 	ourse: bols n ttion models ons sic proving system l connections fiers
Recommended litera 1. Krajči S., https://ic 2. Goldstern M., Juda Logic, A K Peters, W	ature: s.upjs.sk/~krajci/skola/vyucba/ucebneTexty/logika-stromy.pdf ah H.: The Incompleteness Phenomenon, A New Course in Mathematical Vellesley, Massachusetts, 1995
Course language: Slovak	
Notes:	

Course assessment					
Total number of assessed students: 431					
А	В	С	D	Е	FX
26.68	11.37	12.3	10.9	25.99	12.76
Provides: prof. RNDr. Stanislav Krajči, PhD.					
Date of last modification: 04.01.2022					
Approved: prof. RNDr. Gabriel Semanišin, PhD., prof. RNDr. Ivan Žežula, CSc.					

University: P. J. Šafá	rik University in Košice
Faculty: Faculty of S	cience
Course ID: ÚINF/ TSD/19	Course name: Technologies of big data processing
Course type, scope a Course type: Practic Recommended cou Per week: 2 Per stu Course method: pre	nd the method: ce rse-load (hours): dy period: 28 esent
Number of ECTS cr	edits: 2
Recommended seme	ster/trimester of the course: 6.
Course level: I.	
Prerequisities:	
Conditions for cours Active participation,	e completion: written test, class project.
Learning outcomes: Practical experience architecture and impl	with modern Big Data processing and storage systems. Introduction to their ementation.
 Brief outline of the c 1. Introduction to Big 2. Cloud environment 3. Distributed file system 4. Scalability, hashing 5. Distributed databat 6. Batch data process 7. Batch data process 8. Batch data process 9. Stream data process 10. Stream data process 11. Distributed neural 	ourse: 5 Data processing. Freely accessible datasets. t. stems, object storage. Data formats. g, data sharding. ses, consistency trade-offs. NoSQL. ing: MapReduce ing: Spark I ing: Spark II ssing: Kafka essing: Beam l network training.
Recommended litera 1. KLEPPMANN, M scalable, and maintai 2. WHITE, Tom. Hac 978-1-449-31152-0. 3. MARZ, Nathan a time data systems. SH 4. PENTREATH, Nic 978-1-783288-51-9.	artin. Designing data-intensive applications: the big ideas behind reliable, nable systems. Beijing: O'Reilly, 2017. ISBN 978-1-449-37332-0. loop: the definitive guide. 3rd ed. Sebastopol: O'Reilly, 2012. ISBN Vames WARREN. Big data: principles and best practices of scalable real- nelter Island, NY: Manning, [2015]. ISBN 978-1-617290-34-3. ek. Machine Learning with Spark; Packt Publishing, [2015]. ISBN

Course language:

Slovak or English

Notes:

Content prerequisities: database basics, Python programming					
Course assessment Total number of assessed students: 12					
А	В	С	D	Е	FX
100.0	0.0	0.0	0.0	0.0	0.0
Provides: Bc. Marián Dvorský, RNDr. Peter Gurský, PhD., doc. RNDr. Ľubomír Antoni, PhD.					
Date of last modification: 04.01.2022					
Approved: prof. RNDr. Gabriel Semanišin, PhD., prof. RNDr. Ivan Žežula, CSc.					

University: P. J	. Šafárik Univers	sity in Košice			
Faculty: Faculty of Science					
Course ID: ÚF VADA/19	V/ Course na	Course name: Vybrané aplikácie dátovej analýzy			
Course type, sc Course type: I Recommended Per week: 3 Pe Course metho	ope and the met Lecture d course-load (h er study period: d: present	thod: ours): 42			
Number of EC	FS credits: 3				
Recommended	semester/trimes	ster of the cours	e: 6.		
Course level: I.					
Prerequisities:					
Conditions for	course completi	ion:			
Learning outcomes:					
Brief outline of the course:					
Recommended literature:					
Course language:					
Notes:	Notes:				
Course assessment Total number of assessed students: 8					
А	В	С	D	Е	FX
100.0	0.0	0.0	0.0	0.0	0.0
Provides: prof. RNDr. Milan Žukovič, PhD., doc. Mgr. Štefan Parimucha, PhD., RNDr. Martin Val'a, PhD., doc. RNDr. Marek Bombara, PhD.					
Date of last modification: 28.03.2019					
Approved: prof. RNDr. Gabriel Semanišin, PhD., prof. RNDr. Ivan Žežula, CSc.					