CONTENT

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice	

Faculty: Faculty of Science

Course ID: CJP/ PFAJAKA/07	**Course name:** Academic English

Course type, scope and the method:
 Course type: Practice
 Recommended course-load (hours):
 Per week: 2 **Per study period:** 28
 Course method: combined, present

Number of ECTS credits: 2

Recommended semester/trimester of the course:

Course level: I., II., N

Prerequisities:

Conditions for course completion:
 Combined method of teaching (classroom/distance)
 Active classroom participation, assignments handed in on time, 2 absences tolerated
 1 test (10th week), no retake. (in classroom, in case of distance learning due to worsened epidemiological situation – online)
 Presentation on chosen topic (in case of distance learning - online thorugh MS Teams)
 Final evaluation- average assessment of test (40%), essay (30%) and presentation (30%).
 Grading scale: A 93-100%, B 86-92%, C 79-85%, D 72-78%, E 65-71%, FX 64% and less

Learning outcomes:

Brief outline of the course:

Recommended literature:
 Seal B.: Academic Encounters, CUP, 2002
 T. Armer :Cambridge English for Scientists, CUP 2011
 M. McCarthy M., O´Dell F. - Academic Vocabulary in Use, CUP 2008
 Zemach, D.E, Rumisek, L.A: Academic Writing, Macmillan 2005
 Olsen, A. : Active Vocabulary, Pearson, 2013
 www.bbclearningenglish.com
 Cambridge Academic Content Dictionary, CUP, 2009

Course language:
 English language, level B2 according to CEFR.

Notes:

Course assessment
 Total number of assessed students: 380

A	B	C	D	E	FX
33.68	22.11	15.53	10.0	6.58	12.11

Provides: Mgr. Viktória Mária Slovenská

Date of last modification: 17.09.2020

Approved:

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice	

Faculty: Faculty of Science	

Course ID: ÚINF/ PRR1a/15	**Course name:** Advanced programming

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.

Prerequisities:

Conditions for course completion:

Learning outcomes:

Brief outline of the course:

Recommended literature:

Course language:

Notes:

Course assessment
 Total number of assessed students: 71

A	B	C	D	E	FX
53.52	7.04	8.45	4.23	21.13	5.63

Provides: RNDr. Rastislav Krivoš-Belluš, PhD.

Date of last modification: 03.05.2015

Approved:

COURSE INFORMATION LETTER

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

Course ID: ÚINF/ PRR1b/15	**Course name:** Advanced programming

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.
Prerequisities: ÚINF/PRR1a/15
Conditions for course completion:
Learning outcomes:
Brief outline of the course:
Recommended literature:
Course language:
Notes:

Course assessment Total number of assessed students: 42					
A	B	C	D	E	FX
47.62	4.76	0.0	21.43	16.67	9.52

Provides: RNDr. Rastislav Krivoš-Belluš, PhD.
Date of last modification: 03.05.2015
Approved:

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice

Faculty: Faculty of Science

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

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.

Prerequisities: ÚINF/PAZ1a/15 and leboÚINF/ePAZ1a/15 and leboÚINF/PRG1/15

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: 35

A	B	C	D	E	FX
8.57	14.29	25.71	25.71	11.43	14.29

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

Date of last modification: 30.08.2021

Approved:

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice

Faculty: Faculty of Science

Course ID: ÚMV/ ALGa/10	Course name: Algebra I

Course type, scope and the method:
Course type: Lecture / Practice
Recommended course-load (hours):
Per week: 3 / 3 **Per study period:** 42 / 42
Course method: present

Number of ECTS credits: 7

Recommended semester/trimester of the course: 1.

Course level: I.

Prerequisities:

Conditions for course completion:
According to the results from the semester and in view of the results of the written and oral final exam..

Learning outcomes:
To obtain basic knowledge from number theory concerning divisibility and from linear algebra concerning systems of linear equations. To be able to apply it in concrete excercises.

Brief outline of the course:
Divisibility in Z. Fields. Systems of linear equations, Gauss elimination. Maps, permutations. Computing with matrices. Determinants, Cramer rule.

Recommended literature:
T.S Blyth, E.F. Robertson: Basic linear algebra, Springer Verlag, 2001.
K. Jänich: Linear algebra, Springer Verlag, 1991.

Course language:
Slovak

Notes:

Course assessment
Total number of assessed students: 1279

A	B	C	D	E	FX
11.81	11.65	19.0	17.9	28.3	11.34

Provides: prof. RNDr. Danica Studenovská, CSc., RNDr. Igor Fabrici, Dr. rer. nat., RNDr. Lucia Janičková, PhD., RNDr. Simona Rindošová, RNDr. Ivana Varga

Date of last modification: 31.01.2019

Approved:

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice

Faculty: Faculty of Science

Course ID: ÚMV/ ALG3b/10 | **Course name:** Algebra II for informaticians and physicists

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 ECTS credits: 7

Recommended semester/trimester of the course: 2.

Course level: I., II.

Prerequisities: ÚMV/ALGa/10

Conditions for course completion:
 Exam

Learning outcomes:
 To provide deeper knowledge on vector spaces, linear transformations and Euclidean spaces.

Brief outline of the course:
 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 tranformations, matrices of sums and compositions of linear tranformations. 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 and quadrics.

Recommended literature:
 A. F. Beardon: Algebra and Geometry, Cambridge University Press, 2005
 G. Birkhoff, S. Mac Lane: A Survey of Modern Algebra, New York 1965

Course language:
 Slovak

Notes:

Course assessment
 Total number of assessed students: 290

A	B	C	D	E	FX
15.52	10.69	12.76	18.62	31.72	10.69

Provides: doc. RNDr. Roman Soták, PhD., RNDr. Mária Maceková, PhD., RNDr. Lucia Janičková, PhD.

Date of last modification: 26.03.2020

Approved:

COURSE INFORMATION LETTER

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

Course ID: ÚINF/ ASU1/15	**Course name:** Algorithms and data structures

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: 6.

Course level: I.

Prerequisities: (ÚINF/PAZ1a/15 and leboÚINF/ePAZ1a/15),(ÚINF/PAZ1b/15 and leboÚINF/ ePAZ1b/15)

Conditions for course completion:
 Practice activities, homeworks and midterm exam.
 Final examination consisting of practice and theoretical test.

Learning outcomes:
 Understand and learn algorithmic paradigms and data structures. Analyse time complexity of these algorithms.

Brief outline of the course:
 Algorithms' time and space asymptotic complexity. Main Theorem. Amortized complexity.
 Brute Force. Backtrack. Divide and Conquer. Dynamic programming. Comparison and non-comparison sort algorithms. Sweep line algorithms. Graph Theory Algorithms.
 Data structures – queue, stack, priority queue, heap, prefix sum, binary search trees, interval trees, union & find, trie.

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 prerequisities:
 - programming skills in some programming language (Python/Java/C++/...)
 - mathematics:
 -- computing with polynomials, logarithmic and exponential functions

-- computing limits of sequences, L'Hospital rule

Course assessment
Total number of assessed students: 146

A	B	C	D	E	FX
13.01	5.48	17.12	24.66	36.99	2.74

Provides: prof. RNDr. Gabriel Semanišin, PhD., RNDr. Rastislav Krivoš-Belluš, PhD.

Date of last modification: 25.02.2021

Approved:

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice	
Faculty: Faculty of Science	
Course ID: ÚINF/ AFJ1a/15	**Course name:** Automata and formal languages

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.

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 k-equivalence, 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 epsilon-acceptor

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:

Notes:

Course assessment
Total number of assessed students: 850

A	B	C	D	E	FX
25.65	18.24	23.88	17.76	9.65	4.82

Provides: Mgr. Alexander Szabari, PhD., prof. RNDr. Viliam Geffert, DrSc., RNDr. Zuzana Bednárová, PhD.

Date of last modification: 17.08.2021

Approved:

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice

Faculty: Faculty of Science

Course ID: ÚINF/ AFJ1b/15 | **Course name:** Automata and formal languages

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: 5

Recommended semester/trimester of the course: 5.

Course level: I., II.

Prerequisities: ÚINF/AFJ1a/15

Conditions for course completion:
 Test and 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: Pushdown automata: definition of a pushdown automaton, accepting by final states, accepting by empty pushdown
 2: Deterministic pushdown automata: examples of application in practice
 3: Context-free grammars: basic definition, leftmost derivation, derivation tree, elimination of rules of type A→epsilon and A→B, Chomsky normal form
 4: Relation between context-free grammars and pushdown automata: transforming context-free grammar to a pushdown automaton, transforming pushdown automaton to a context-free grammar
 5: Pumping lemma I: Statement of the lemma and its proof
 6: Pumping lemma II: applications of the lemma
 7: Closure properties of context-free languages
 8: Closure properties of deterministic context-free languages
 9: Pushdown automata producing an output: basic definitions and properties, applications in practice
 10: Context-sensitive languages: context-sensitive grammar, nondeterministic linear-bounded Turing machine (LBA), transforming context-sensitive grammar to an LBA, transforming LBA to a context-sensitive grammar
 11: Closure properties of context-sensitive languages
 12: Recursively enumerable languages: phrase-structure grammar, nondeterministic and deterministic Turing machine, transforming nondeterministic Turing machine to a phrase-structure grammar, transforming phrase-structure grammar to a deterministic Turing machine, closure properties
 13: Universal Turing machine
 14: Algorithmically undecidable problems of the formal language theory

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:

Notes:

Course assessment
Total number of assessed students: 567

A	B	C	D	E	FX
37.92	15.87	19.75	17.64	6.17	2.65

Provides: prof. RNDr. Viliam Geffert, DrSc., Mgr. Alexander Szabari, PhD., RNDr. Zuzana Bednárová, PhD.

Date of last modification: 17.08.2021

Approved:

COURSE INFORMATION LETTER

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

Course ID: ÚMV/ BKP2/14	**Course name:** Bachelor project

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 credits: 2

Recommended semester/trimester of the course: 5.

Course level: I.

Prerequisities:

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 or English

Notes:

Course assessment
 Total number of assessed students: 135

abs	n
100.0	0.0

Provides: doc. RNDr. Dušan Šveda, CSc.

Date of last modification: 03.05.2015

Approved:

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice	

Faculty: Faculty of Science	

Course ID: ÚMV/ BPO/14	**Course name:** Bachelor thesis and its defence

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: I.

Prerequisities:

Conditions for course completion:
 Acquiring the required number of credits in the structure defined by the study plan.

Learning outcomes:
 Evaluation of student's competences with respect to the profile of the graduate.

Brief outline of the course:
 Presentation of results of the bachelor thesis, answering the questions of the thesis supervisor and answering the questions of members of evaluation commitee.

Recommended literature:

Course language:

Notes:

Course assessment
 Total number of assessed students: 81

A	B	C	D	E	FX
67.9	20.99	6.17	3.7	1.23	0.0

Provides:

Date of last modification: 03.05.2015

Approved:

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice	

Faculty: Faculty of Science	

Course ID: ÚMV/ ZBR/14	**Course name:** Bridge fundamentals

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.

Prerequisities:

Conditions for course completion:
 Active participation on exercises.

Learning outcomes:
 A student gets acquainted with fundamentals of the contract bridge, develops his/her logical thinking and consolidates his/her habits of positive social behaviour.

Brief outline of the course:
 Bridge rules.
 Principles of the bidding system Standard American.
 Basic techniques of declarer's play.
 Basic techniques of the defence.
 Lead conventions, signals.
 Common bidding conventions.
 Selected advanced techniques of the card play.
 Partnership cooperation in the contract bridge.
 Bridge ethics.

Recommended literature:
 T. Menyhért: Kurz bridžu 2013, http://new.bridgekosice.sk/kurz-bridzu-2013/
 R. Pavlicek: Learn To Play Bridge!, http://www.rpbridge.net/1a00.htm
 ACBL SAYC System Booklet, http://ebookbrowsee.net/acbl-sayc-pdf-d201415187

Course language:
 Slovak or English

Notes:
 Minimum number of participants is 4.

Course assessment
 Total number of assessed students: 25

abs	n
96.0	4.0

Provides: doc. RNDr. Miroslav Ploščica, CSc., prof. RNDr. Mirko Horňák, CSc.
Date of last modification: 03.05.2015
Approved:

COURSE INFORMATION LETTER

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

Course ID: KOP/ OPaPDV/14	**Course name:** Civil Law and Intellectual Property Rights

Course type, scope and the method:
  Course type: Lecture
  Recommended course-load (hours):
  Per week: 2 **Per study period:** 28
  Course method: present

Number of ECTS credits: 4

Recommended semester/trimester of the course: 3., 5.

Course level: I., II., N

Prerequisities:

Conditions for course completion:

Learning outcomes:

Brief outline of the course:

Recommended literature:

Course language:

Notes:

Course assessment
 Total number of assessed students: 103

abs	n
94.17	5.83

Provides: doc. JUDr. Renáta Bačárová, PhD., LL.M., prof. JUDr. Peter Vojčík, CSc.

Date of last modification: 16.12.2020

Approved:

<div align="center">**COURSE INFORMATION LETTER**</div>

University: P. J. Šafárik University in Košice

Faculty: Faculty of Science

Course ID: CJP/ PFAJKKA/07	**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:** combined, present

Number of ECTS credits: 2

Recommended semester/trimester of the course:

Course level: I., II., N

Prerequisities:

Conditions for course completion: Active participation in class and completed homework assignments. Students are allowed to miss two classes at the most. Online teaching (MS Teams), in case of an improved epidemiological situation = on-site teaching. 2 credit tests (presumably in weeks 6/7 and 12/13) and a short oral presentation in English. The tests will be taken online (MS Teams) during online teaching and in class in case of on-site classes. The presentation will be sent to the course instructor as a video recording. Final evaluation consists of the scores obtained for the 2 tests (70%) and the presentation (30%). 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: Uplatnenie a aktívne používanie svojich teoretických vedomostí v praktických komunikačných situáciách. Zdokonalenie jazykových vedomostí a zručností študenta, rečovej, pragmatickej a vecnej kompetencie, predovšetkým zlepšujú komunikáciu, schopnosťprijímať a formulovať výpovede, efektívne vyjadrovať svoje myšlienky ako aj orientovať sa v obsahovom pláne výpovede. Precvičovanie rečových intencií kontaktných (napr. pozdravy, oslovenia, pozvanie, oslovenie), informatívnych (napr. získavanie a podávanie informácií, vyjadrenie priestorových a časových vzťahov), regulačných (napr. prosba, poďakovanie, zákaz, pochvala, súhlas, nesúhlas) a hodnotiacich (napr. vyjadrenie vlastného názoru, stanoviska, želania, emócií). Výsledkom budovania praktickej jazykovej kompetencie majú byť vedomosti a zručnosti zodpovedajúce požiadavkám a kritériám dokumentu Spoločný európsky referenčný rámec pre vyučovanie jazykov.

Brief outline of the course: Rodina, jej formy a problémy Vyjadrovanie pocitov a dojmov Dom, bývanie a budúcnosť Formy a dialekty v anglickom jazyku Život v meste a na vidieku Kolokácie a idiomy, zaužívané slovné spojenia Prázdniny a sviatky vo svete

Životné prostredie a ekológia
Výnimky zo slovosledu
Frázové slovesá a ich použitie
Charakteristiky neformálneho diškurzu

Recommended literature:
www.bbclearningenglish.com
McCarthy M., O'Dell F.: English Vocabulary in Use, Upper-Intermediate. CUP, 1994.
Misztal M.: Thematic Vocabulary. SPN, 1998.
Fictumova J., Ceccarelli J., Long T.: Angličtina, konverzace pro pokročilé. Barrister and Principal, 2008.
Peters S., Gráf T.: Time to practise. Polyglot, 2007.
Jones L.: Communicative Grammar Practice. CUP, 1985.
Alexander L.G.: Longman English Grammar. Longman, 1988.

Course language:
English language, B2 level according to CEFR

Notes:

Course assessment
Total number of assessed students: 260

A	B	C	D	E	FX
40.38	22.31	18.85	8.85	6.54	3.08

Provides: Mgr. Barbara Mitríková, Mgr. Zuzana Naďová

Date of last modification: 11.02.2021

Approved:

COURSE INFORMATION LETTER

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

Course ID: CJP/ PFAJGA/07	**Course name:** Communicative Grammar in English

Course type, scope and the method:
 Course type: Practice
 Recommended course-load (hours):
 Per week: 2 **Per study period:** 28
 Course method: combined, present

Number of ECTS credits: 2

Recommended semester/trimester of the course:

Course level: I., II., N

Prerequisities:

Conditions for course completion:
 Active classroom participation (max. 2x90 min. absences tolerated). 2 test (5th/6th and 12/13th week), no retake. Final evaluation- average assessment of tests. Grading scale: A 93-100%, B 86-92%, C 79-85%, D 72-78%, E 65-71%, FX 64% and less.

Learning outcomes:

Brief outline of the course:

Recommended literature:
 Vince M.: Macmillan Grammar in Context, Macmillan, 2008
 McCarthy, O'Dell: English Vocabulary in Use, CUP, 1994
 C. Oxengen, C. Latham-Koenig: New English File Advanced, Oxford 2010
 Misztal M.: Thematic Vocabulary, Fragment, 1998
 www.bbclearningenglish.com
 ted.com/talks

Course language:

Notes:

Course assessment
 Total number of assessed students: 406

A	B	C	D	E	FX
39.66	18.97	16.75	8.62	5.91	10.1

Provides: Mgr. Lenka Klimčáková

Date of last modification: 14.09.2019

Approved:

COURSE INFORMATION LETTER

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

Course ID: KGER/ NJKG/07	**Course name:** Communicative Grammar in German Language

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:

Learning outcomes:

Brief outline of the course:

Recommended literature:

Course language:

Notes:

Course assessment
 Total number of assessed students: 54

A	B	C	D	E	FX
59.26	11.11	9.26	3.7	9.26	7.41

Provides: Mgr. Blanka Jenčíková

Date of last modification: 03.05.2015

Approved:

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice

Faculty: Faculty of Science

Course ID: ÚINF/ PSIN/15	Course name: Computer network Internet

Course type, scope and the method:
 Course type: Lecture / Practice
 Recommended course-load (hours):
 Per week: 3 / 1 **Per study period:** 42 / 14
 Course method: present

Number of ECTS credits: 5

Recommended semester/trimester of the course: 4., 6.

Course level: I.

Prerequisities: ÚINF/PAZ1a/15 and leboÚINF/ePAZ1a/15 and leboÚINF/PRG1/15

Conditions for course completion:
 Activity at excercises (max 18 points), home work (max 18 points), test (max 30 points).
 Verbal exam (min 25 points, max 50 points). Required minimum for passing the course is 55 points.

Learning outcomes:
 To understand ISO OSI reference model for network communication, to analyze communication channels parameters, to understand different access methods, to be familiar with the function of center network devices (hub, switch, router), to understand IP protocol, IP addresses and the transfer of internet packets, to understand reliable data transfer of the TCP protocol, to be able to use Sockets in won application, to know basic application protocols.

Brief outline of the course:
 1. Introduction to computer networks, internet connection types, delay and loss in packet-switched networks, ISO OSI reference model and TCP/IP protocols family.
 2. Application layer: Web and HTTP, protocol FTP ,e-mail and SMTP, POP3, IMAP,
 3. Application layer: domain names and DNS, Peer-to-peer applications. Security in computer networks.
 4. Transport layer: services, multiplexing and demultiplexing, protocol UDP, reliable data transfer
 5. Transport layer: connection oriented transport protocol TCP, flow and congestion control.
 6. Network Layer: Internet protocol IPv4, virtual circuit and datagram networks, packet fragmentation, routing table, application protocol DHCP
 7. Network Layer: network address translation NAT, ICMP protocol, internet protocol IPv6
 8. Network Layer: routing algorithms and protocols, broadcast and multicast routing
 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:

Notes:

Course assessment
Total number of assessed students: 791

A	B	C	D	E	FX
9.73	5.18	12.64	16.43	36.16	19.85

Provides: doc. RNDr. Jozef Jirásek, PhD., RNDr. Peter Gurský, PhD.

Date of last modification: 09.07.2021

Approved:

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice

Faculty: Faculty of Science

Course ID: ÚINF/ KOPR/19	**Course name:** Concurrent programming

Course type, scope and the method:
 Course type: Lecture / Practice
 Recommended course-load (hours):
 Per week: 1 / 2 **Per study period:** 14 / 28
 Course method: present

Number of ECTS credits: 4

Recommended semester/trimester of the course: 5.

Course level: I.

Prerequisities: ÚINF/PAZ1a/15 and leboÚINF/ePAZ1a/15

Conditions for course completion:
 Final projects in area of parallel and distributed programming

Learning outcomes:
 Ability to create thread safe programs, cooperation and synchronization of threads, design pattern "Work stealing", interruption of threads. Reactive programmig in Project Reactor.Technologies SOAP, Akka, Apache Kafka and RabbitMQ.

Brief outline of the course:
 1, Introduction to threads
 2, Stale data and data publication
 3, Composing thread safe classes
 4, Concurrent collections
 5, Thread coordination
 6, Executors
 7, ForkJoinPool - work stealing pattern
 8, Tasks cancellation
 9, Threads in JavaFx
 10, Reactive programmig - Project Reactor
 11, WebFlux - reactive REST server
 12, SOAP Web Services - From code to WSDL
 13, SOAP Web Services - From WSDL to code
 14, Actor model and Akka
 15, RabbitMQ
 16, Apache Kafka

Recommended literature:
 1. B. Goetz, Tim Peierls, Joshua Bloch, Joseph Bowbeer, David Holmes, Doug Lea: Java Concurrency in Practice; Addison-Wesley Professional, 2006
 2. P. Hyde: Java Thread Programming; Sams, 1999
 3. T. White: Hadoop: The Definitive Guide; Yahoo Press; Second Edition edition, 2010

Course language:

Notes:					
Course assessment Total number of assessed students: 78					
A	B	C	D	E	FX
44.87	25.64	15.38	10.26	3.85	0.0
Provides: RNDr. Peter Gurský, PhD., RNDr. Róbert Novotný, PhD.					
Date of last modification: 09.07.2021					
Approved:					

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice	

Faculty: Faculty of Science	

Course ID: ÚMV/ KOP/10	**Course name:** Convex programming

Course type, scope and the method:
 Course type: Lecture / Practice
 Recommended course-load (hours):
 Per week: 3 / 1 **Per study period:** 42 / 14
 Course method: present

Number of ECTS credits: 5

Recommended semester/trimester of the course: 4.

Course level: I.

Prerequisities: ÚMV/LCO/10,(ÚMV/MAN1c/10 and leboÚMV/MAN2d/10 and leboÚMV/ FRPb/19)

Conditions for course completion:
 Based on the results of written tests (two per term, with emphasis on problem solving) and on the oral examination.

Learning outcomes:
 To learn the theoretical basis and the most important methods of nonlinear programming

Brief outline of the course:
 Practical problems leading to a nonlinear program. Convex sets and their properties. Convex functions – properties and criteria of convexity. Necessary and sufficient conditions of optimality. Karush-Kuhn-Tucker conditions. Quadratic programming.

Recommended literature:
 Bazaraa, Sherali, Shetty: Nonlinear programming, Wiley, New York 1993

Course language:
 Slovak or English

Notes:

Course assessment
 Total number of assessed students: 79

A	B	C	D	E	FX
12.66	13.92	8.86	11.39	53.16	0.0

Provides: prof. RNDr. Tomáš Madaras, PhD., Mgr. Alfréd Onderko

Date of last modification: 03.05.2015

Approved:

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice	

Faculty: Faculty of Science	

Course ID: ÚMV/ ADA/19	**Course name:** Data analysis

Course type, scope and the method:
 Course type: Lecture / Practice
 Recommended course-load (hours):
 Per week: 1 / 3 **Per study period:** 14 / 42
 Course method: present

Number of ECTS credits: 4

Recommended semester/trimester of the course: 2.

Course level: I., II.

Prerequisities: ÚMV/UAD/10

Conditions for course completion:
 Individual project work. Oral presentation of the individual project work.

Learning outcomes:
 Students will gain practical skills in applying basic statistical methods of estimating and testing on real data using statistical software. At the same time, they will develop a concrete idea of the basic statistical concepts and methods discussed from a theoretical point of view in the following subjects.

Brief outline of the course:
 1. Data visualization using statistical software R.
 2. Basic principles of statistical inference. Random sample from normal distribution, q-q plot, testing of normality.
 3. Confidence intervals for proportions.
 4. Confidence intervals for means.
 5. Testing hypotheses about proportions and means.
 6. Relationships between quantitative variables. Linear regression, multiple regression.
 7. Goodness-of-Fit tests and contingency tables. Relationships between qualitative variables.
 8. Analysis of variance (principle, testing, graphical representation).
 9. Nonparametric methods of testing.

Recommended literature:
 1. Utts, J.M., Heckard, R.F. (2014): Mind od Statistics, 5th ed., Thomson Brooks/Cole
 2. CRAWLEY, M.J. (2005), Statistics: An Introdution using R, New York: Wiley
 3. WICKHAM, H. (2016), ggplot2: Elegant Graphics for Data Analysis, 2nd ed. Springer
 4. MOORE, D.S.(2000), The Active Practice of Statistics, New York: W. H. Freeman
 5. Anděl J. (2011): Základy matematické statistiky, MatfyzPress, Praha (in Czech.)

Course language:

Notes:

Course assessment Total number of assessed students: 15					
A	B	C	D	E	FX
66.67	20.0	13.33	0.0	0.0	0.0

Provides: RNDr. Martina Hančová, PhD., RNDr. Andrej Gajdoš, PhD.

Date of last modification: 18.03.2019

Approved:

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice	

Faculty: Faculty of Science	

Course ID: ÚMV/ MAD/14	**Course name:** Data modelling and analysis by means of CAS systems

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 ECTS credits: 4

Recommended semester/trimester of the course: 5.

Course level: I.

Prerequisities:

Conditions for course completion:
examination based on working-out the solution of a given real problem using a computer algebra system

Learning outcomes:
To provide knowledge and skills for mathematical modelling and data analysis using computer algebra systems.

Brief outline of the course:
The Maple and Mathematica CAS systems: comparison, environment, basic functionality and language syntax. Data import and export, visualizations and analyses. Basic and advanced techniques of mathematical modelling using CAS.

Recommended literature:
the reference manual to Maple / Mathematica
I. Shingareva, C. Lizarrága-Celaya: Maple an Mathematica. A Problem Solving Approach for Mathematics, Springer-Verlag/Wien, 2007, 2009
A. Heck: Introduction to Maple, Springer-Verlag, New York, 2003

Course language:
Slovak or English

Notes:

Course assessment
Total number of assessed students: 9

abs	n
100.0	0.0

Provides: prof. RNDr. Tomáš Madaras, PhD.

Date of last modification: 03.05.2015

Approved:

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice	

Faculty: Faculty of Science	

Course ID: ÚINF/ DBS/15	**Course name:** Database systems for Mathematicians

Course type, scope and the method:
 Course type: Lecture / Practice
 Recommended course-load (hours):
 Per week: 3 / 2 **Per study period:** 42 / 28
 Course method: present

Number of ECTS credits: 6

Recommended semester/trimester of the course: 1.

Course level: I., II.

Prerequisities:

Conditions for course completion:
 Written works during the semester, project.
 Written and oral exam.

Learning outcomes:
 Acquired basic and advanced concepts and techniques of relational database theory and corresponding software. Know the principles of relational databases and learn the basics of query language. Understand the formal foundations of database systems - three-valued logic, relational algebra, functional dependency and normalization. Be able to model and design DB, and the role of data warehouses.

Brief outline of the course:
 1) Relational databases. Query language SQL, filtering; Stored procedures.
 2) Data types, operators, numerical, string and time functions; System and user functions.
 3) JOIN operations; Views. CTE.
 4) AGGREGATION AND GROUP BY; Recursion and transitive closure.
 5) Data and database models. Relational scheme. RDB principles. Data integrity; Transactions.
 6) DB design, ER diagrams; Triggers and integrity.
 7) System commands about DB and tables. Cascading deletion and update; Cursors.
 8) Nested queries. ROLLUP. CASE expression; Physical organization of data.
 9) Three-valued logic. Quantifiers and NOT. Set operations; B-trees and indexes.
 10) Data science and knowledge acquisition using R; Functional dependencies.
 11) Data warehouses. Data cube. Pivot table.
 12) Relational algebra. Normalization of relational databases; The latest normal form - ETNF.

Recommended literature:
 - C.J. Date, Database Design and Relational Theory, 2012, O'Reilly Media, Inc., ISBN: 978-1-449-32801-6
 - J. Murach, Murach's MySQL, 3rd Edition, 2019, Mike Murach & Associates, Inc., ISBN-10: 1943872368
 - R. Ramakrishnan, J. Gehrke, Database Management Systems, 2020, McGraw-Hill, ISBN13 9780071231510
 - S. Krajčí: Databázové 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: 978-1-5093-0200-0

Course language:

Notes:

Course assessment
Total number of assessed students: 710

A	B	C	D	E	FX
12.68	9.58	13.24	20.42	33.8	10.28

Provides: doc. RNDr. Csaba Török, CSc.

Date of last modification: 02.07.2021

Approved:

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice	

Faculty: Faculty of Science

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

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 and leboÚMV/DSM3a/10

Conditions for course completion:
 Two tests during the semester
 It is made on the base of results of two tests during the semester (50%)and a final written exam and an oral exam (50%)

Learning outcomes:
 Mastered funamental methods of graph theory. To be familiar with some possibilities of applications of graph theory

Brief outline of the course:
 Introduction to graphs.
 Connectivity and distance in graphs.
 Trees, spanning subgraphs
 Independence and coverings.
 Introduction to the Ramsey theory.
 Introduction to the extremal graph theory.
 Matchings: Theorem of Hall, theorem of Berge, optimal assignment problems.
 Vertex colorings: Theorem of Brooks, Theorem of Erdos and Szekeres.
 Chromatic polynomials.
 Edge colourings, Theorem of Koenig.
 Introduction to directed graphs: Basic notions, connectivities, tounaments, acyclic graphs, base and kernel of a graph.
 Introduction to applications of graphs.

Recommended literature:
 1. A. Bondy and U.S.R. Murty: Graph theory, Springer-Verlag 2008
 2. G. Chartrand, L. Lesniak, and P. Zhang, Graphs and digraphs, CRC Press, Boca Raton 2011
 3. R. Diestel: Graph Theory, Springer-Verlag, New York, Inc. 1997
 4.M.N.S. Swamy and K. Thulasiraman: Graphs, Networks and Algorithms.
 Willey Interscience Publ., New York 1981

Course language:
 Slovak

Notes:

Course assessment
Total number of assessed students: 179

A	B	C	D	E	FX
14.53	10.61	24.58	25.7	18.44	6.15

Provides: RNDr. Igor Fabrici, Dr. rer. nat., RNDr. Mária Maceková, PhD.

Date of last modification: 03.05.2015

Approved:

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice	

Faculty: Faculty of Science

Course ID: ÚMV/ DSMc/10	**Course name:** Discrete mathematics III

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: 5.

Course level: I.

Prerequisities: ÚMV/DSMb/10

Conditions for course completion:
 Two tests during the semester
 It is made on the base of results of two tests during the semester (50%)and a final written exam and an oral exam (50%)

Learning outcomes:
 Mastered fundamental methods of graph theory. Abilities of applications of graph theory.

Brief outline of the course:
 Eulerian and Hamiltonian graphs.
 Connectivity: Theorem of Menger.
 Matching: Theorem of Tutte.
 Planar graphs: Theorem of Kuratowski.
 Plane graphs: Euler polyhedral formula and its consequences,
 Introduction to the theory of light graphs in plane graphs.
 Colourings of plane graphs.
 Crossing numbers of graphs.
 Introduction to the topological graph theory.
 Edge colourings: Theorem of Vizing.
 Application of Graph theory: The shortest path problem, the critical path method.

Recommended literature:
 1. A. Bondy and U.S.R. Murty: Graph theory, Springer-Verlag 2008
 2. G. Chartrand, L. Lesniak, and P. Zhang, Graphs and digraphs, CRC Press, Boca Raton 2011
 3. R. Diestel: Graph Theory, Springer-Verlag, New York, Inc. 1997
 4.M.N.S. Swamy and K. Thulasiraman: Graphs, Networks and Algorithms.
 Willey Interscience Publ., New York 1981

Course language:
 Slovak

Notes:

Course assessment					
Total number of assessed students: 77					

A	B	C	D	E	FX
15.58	31.17	15.58	24.68	12.99	0.0

Provides: prof. RNDr. Tomáš Madaras, PhD., RNDr. Mária Maceková, PhD.

Date of last modification: 03.05.2015

Approved:

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice	

Faculty: Faculty of Science

Course ID: ÚMV/ DSM3a/10	**Course name:** Discrete mathematics for informaticians

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: 3.

Course level: I.

Prerequisities:

Conditions for course completion:
 Based on results of two semestral tests.
 Based on semestral evaluation and the result of examination.

Learning outcomes:
 To present the basics of combinatorics and their applications in computer science.

Brief outline of the course:
 Mathematical induction and Dirichlet principle. The sum and the product rule. Permutations, k-permutations, combinations. Selections with repetitions. The inclusion/exclusion principle. Recurrent equations. Introduction to graph theory. Trees. Eulerian and Hamiltonian graphs. Planar graphs. Graph colourings.

Recommended literature:
 1. S. Jendroľ, P. Mihók: Diskrétna matematika I., UPJŠ Košice 1992
 2. J. Nešetřil, J. Matoušek: Kapitoly z diskrétni matematiky
 3. E. R. Scheinerman: Mathematics - a discrete introduction, Brooks/Cole Publ. Comp. Pacific Grove 2000.
 4. R.P. Grimaldi: Discrete and Computational Mathematics, Addison-Wesley Publ. Co.-Rending 1994.

Course language:
 Slovak

Notes:

Course assessment
 Total number of assessed students: 274

A	B	C	D	E	FX
5.47	2.92	9.49	16.79	52.92	12.41

Provides: RNDr. Mária Maceková, PhD.

Date of last modification: 22.09.2019

Approved:

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice

Faculty: Faculty of Science

Course ID: ÚMV/ DYS/19	Course name: Dynamic systems

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: 5.

Course level: I.

Prerequisities: ÚMV/FRPb/19

Conditions for course completion:
 Ongoing evaluation takes the form of a written test during the semester and programming assigned procedure in pre-selected software. The overal evaluation is based on a result of mid-term evaluation (60%) and the result of final written and oral examination (40%).

Learning outcomes:
 The course provides students deep knowledge of the theory of dynamical systems from the theoretical and practical point of view (their modeling, their properties and numerical simulation). Emphasis is put on an interdisciplinary approach and hte usage of software.

Brief outline of the course:
 1. Basic notions of the theory of dynamical systems and their properties.
 2. Differential equations and systems - their relationship, methods of solution.
 3. Difference equations and systems - methods of solution.
 4. Stability and chaotic behavior of the dynamical systems, bifurcation.
 5. Numerical methods as dynamical systems, analysis of algorithms.
 6. 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 language:

Notes:					
Course assessment Total number of assessed students: 0					
A	B	C	D	E	FX
0.0	0.0	0.0	0.0	0.0	0.0
Provides: doc. RNDr. Ondrej Hutník, PhD., Mgr. Jozef Kiseľák, PhD.					
Date of last modification: 27.03.2019					
Approved:					

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice

Faculty: Faculty of Science

Course ID: CJP/ PFAJ4/07	Course name: English Language of Natural Science

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: 2.

Course level: I.

Prerequisities:

Conditions for course completion:
 Distant form of study (Online through MS teams) - based on the sylabus
 Active participation in class and completed homework assignments. Students are allowed to miss 2 classes at the most (in case of online form - not attending online class/ assignments not handed in)
 Continuous assessment: 2 credit tests taken thorugh MS Teams online(presumably in weeks 6 and 13) and academic presentation in English given through MS Teams online.
 In order to be admitted to the final exam, a student has to score at least 65 % as a sum of both credit tests.
 The exam test results represent 50% of the final grade for the course, continuous assessment results represent the other 50% of the final grade.
 The final grade for the course 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:
 Enhancement of students' language skills (speaking, writing, reading and listening comprehension) in English for specific purposes and development of students' language competence (familiarization with selected phonological, lexical and syntactic phenomena), improvement of students' pragmatic competence (familiarization with selected language functions) and improvement of presentation skills at B2 level (CEFR) with focus on terminology of English for natural science.

Brief outline of the course:
 1. Introduction to studying language
 2. Selected aspects of scientific language
 3. Talking about academic study
 4. Discussing science
 5. Defining scientific terminology and concepts
 6. Expressing cause and effect
 7. Describing structures
 8. Explaining processes
 9. Comparing objects, structures and concepts
 10. Talking about problem and solution
 11. Referencing authors

12. Giving examples
13. Visual aids and numbers
14. Referencing time and place
Presentation topics related to students´study fields.

Recommended literature:
study materials provided by the course instructor
Redman, S.: English Vocabulary in Use, Pre-intermetdiate, Intermediate. Cambridge University Press, 2003.
Armer, T.: Cambridge English for Scientists. CUP, 2011.
Wharton J.: Academic Encounters. The Natural World. CUP, 2009.
Murphy, R.: English Grammar in Use. Cambridge University Press, 1994.
P. Fitzgerald : English for ICT studies. Garnet Publishing, 2011.
https://worldservice/learningenglish, https://spectator.sme.sk
www.isllibrary.com

Course language:

Notes:

Course assessment
Total number of assessed students: 2744

A	B	C	D	E	FX
38.16	25.4	16.65	9.73	7.87	2.19

Provides: Mgr. Lenka Klimčáková, Mgr. Viktória Mária Slovenská, Mgr. Zuzana Naďová

Date of last modification: 14.02.2021

Approved:

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice	

Faculty: Faculty of Science	

Course ID: ÚMV/ FRPa/19	**Course name:** Function of real variable

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: 3.

Course level: I.

Prerequisities:

Conditions for course completion:
 Written exam.

Learning outcomes:
 The course provides an introductory knowledge on basic tools of differential and integral calculus of real functions of one real variable, and a development of certain calculation skills in the field.

Brief outline of the course:
 1. Basics of mathematical logic and notations.
 2. Real functions - basic notions, operation, graphs, continuity.
 3. Differential calculus of functions of one real variable - differentiability, using the derivative.
 4. Integral calculus of functions of one real variable - Newton integral.

Recommended literature:
 1. Brannan, D.: A First Course in Mathematical Analysis, Cambridge University Press, Cambridge 2006.
 2. Bruckner, A. M., Bruckner J. B., Thomson, B. S.: Real Analysis, Second Edition, ClassicalRealAnalysis.com, 2008.
 3. Zorich, V. A.: Mathematical Analysis I, Springer-Verlag 2002.

Course language:

Notes:

Course assessment
 Total number of assessed students: 621

A	B	C	D	E	FX
7.89	9.02	15.46	22.38	35.59	9.66

Provides: doc. RNDr. Ondrej Hutník, PhD., RNDr. Lenka Halčinová, PhD., RNDr. Jana Borzová, PhD.

Date of last modification: 26.03.2019

Approved:

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice	

Faculty: Faculty of Science

Course ID: ÚMV/ FRPb/19	**Course name:** Function of real variables

Course type, scope and the method:
 Course type: Lecture / Practice
 Recommended course-load (hours):
 Per week: 4 / 3 **Per study period:** 56 / 42
 Course method: present

Number of ECTS credits: 8

Recommended semester/trimester of the course: 4.

Course level: I., II.

Prerequisities: ÚMV/FRPa/19 and leboÚMV/MZIb/10

Conditions for course completion:
Ongoing evaluation takes the form of small tests, projects and two main online tests during the semester. Overall evaluation is given by ongoing evaluation (60%), written and oral part of the exam (40%).

Learning outcomes:
The course provides students the basics of mathematical analysis necessary to study physics and computer science and related fields. The students also learn mathematical culture, notation and mathematical way of thinking and expression.

Brief outline of the course:

Recommended literature:
1. B. Mihalíková, J. Ohriska: Matematická analýza 1, 2, vysokoškolský učebný text, UPJŠ v Košiciach, Košice, 2000, 2007. 2. L. Kluvánek, I. Mišík, M. Švec: Matematika I, II, SVTL, Bratislava, 1959. 3. Z. Došlá, O. Došlý: Diferenciální počet funkcí více proměnných, vysokoškolský učebný text, Masarykova univerzita 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:

Notes:

Course assessment
 Total number of assessed students: 500

A	B	C	D	E	FX
9.8	11.6	14.2	22.2	35.8	6.4

Provides: Mgr. Jozef Kiseľák, PhD., RNDr. Jaroslav Šupina, PhD.

Date of last modification: 31.03.2020

Approved:

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice	

Faculty: Faculty of Science	

Course ID: ÚINF/ FUN1/15	**Course name:** Functional programming

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: 4

Recommended semester/trimester of the course: 5.

Course level: I.

Prerequisities: ÚINF/PAZ1a/15 and leboÚINF/ePAZ1a/15

Conditions for course completion:

Learning outcomes:
To learn bases of declarative programming (as complementary method to procedural programming) and basic methods of implementations of functional programming languages.

Brief outline of the course:
Principles of functional programming. Lambda calculus from the functional programming languages point of view. Properties of functional programming languages. Programming language Haskell: the structure of the language and basic computational rule, basic data types, lists, recursion and induction, trees

Recommended literature:
BIRD, R., WADLER, P.: Introduction to Functional Programming. Prentice Hall International, 1988.
LIPOVAČA, M.: Learn You Haskell for Great Good!. Free from http://learnyouahaskell.com/

Course language:

Notes:

Course assessment
Total number of assessed students: 250

A	B	C	D	E	FX
21.6	15.2	15.6	14.4	32.4	0.8

Provides: prof. RNDr. Stanislav Krajči, PhD., doc. RNDr. Ondrej Krídlo, PhD.

Date of last modification: 03.05.2015

Approved:

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice	

Faculty: Faculty of Science

Course ID: ÚGE/ GIS/15	**Course name:** Geographic Information Systems

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: 6

Recommended semester/trimester of the course: 3., 5.

Course level: I., II.

Prerequisities:

Conditions for course completion:
The assessment is a combination of continual control during the practicals and the final exam in the examination period. The continual assessment is performed during the semester and it involves 1 written test in the mid-term of the semester and a project report generated according to the assignment and practical skills acquired during the practicals. The student can go for the final exam in case he or she acquired at least the E mark in the continual assessment. The final assessment mark is the result of the average of the marks received in the mid-term test, project report and final exam. The final exam is a written test. The credits are given in case the student had reached at least the E mark in continual assessment and final exam. The following marking scheme is applied in the assessment: A (100-90 points), B (80-89 points), C (70-79 points), D (60-69 points), E (50-59 points), FX (0-49 points).

Learning outcomes:
The student will understand the basics of the theory of geoinformation science, GIS, and Remote Sensing. The student will be able perform tasks in a GIS software, generate thematic amps and conduct basic spatial analyses such as spatial querries, atribute querries, terrain modelling, editing custom geodata, importing geodata.

Brief outline of the course:

Recommended literature:

Course language:
 Slovak or Czech or English

Notes:

Course assessment
 Total number of assessed students: 344

A	B	C	D	E	FX
29.65	25.0	25.58	13.37	6.4	0.0

Provides: doc. Mgr. Michal Gallay, PhD., Mgr. Michaela Nováková

Date of last modification: 16.09.2017

Approved:

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice	

Faculty: Faculty of Science	

Course ID: KF/ DF2p/03	**Course name:** History of Philosophy 2 (General Introduction)

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: 6.

Course level: I., II.

Prerequisities:

Conditions for course completion:

Learning outcomes:

Brief outline of the course:

Recommended literature:

Course language:

Notes:

Course assessment
 Total number of assessed students: 742

A	B	C	D	E	FX
60.78	13.88	12.67	8.63	3.37	0.67

Provides: Doc. PhDr. Peter Nezník, CSc., PhDr. Katarína Mayerová, PhD., doc. Mgr. Róbert Stojka, PhD.

Date of last modification: 25.03.2020

Approved:

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice	

Faculty: Faculty of Science	

Course ID: Dek. PF UPJŠ/USPV/13	**Course name:** Introduction to Study of Sciences

Course type, scope and the method:
  Course type: Lecture / Practice
  Recommended course-load (hours):
  Per week: Per study period: 12s / 3d
  Course method: present

Number of ECTS credits: 2

Recommended semester/trimester of the course: 1.

Course level: I.

Prerequisities:

Conditions for course completion:

Learning outcomes:

Brief outline of the course:

Recommended literature:

Course language:

Notes:

Course assessment
 Total number of assessed students: 1734

abs	n
86.51	13.49

Provides: doc. RNDr. Marián Kireš, PhD.

Date of last modification: 25.09.2019

Approved:

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice	

Faculty: Faculty of Science

Course ID: ÚINF/ UGR1/15	**Course name:** Introduction to computer graphics

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: 3., 5.

Course level: I., II.

Prerequisities:

Conditions for course completion:

Learning outcomes:
 To provide the students with knowledge of graphics algorithms and basic principles of computer graphics.

Brief outline of the course:
 Graphics hardware, input and output devices. Color models, palettes. Raster graphics algorithms for drawing 2D primitives. Filling and clipping. Curve modeling, interpolations and approximations, spline forms, Bézier curves, B-splines, surfaces. Homogenous coordinates, affine transformations, perspective and parallel projections. Visible-surface determination, illumination and shading. Rendering techniques, photorealism, textures, ray tracing, radiosity. Object representations, computer animation, virtual reality.

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: 297

A	B	C	D	E	FX
13.8	10.44	13.8	23.57	29.97	8.42

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

Date of last modification: 03.05.2015

Approved:

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice	

Faculty: Faculty of Science

Course ID: ÚMV/ UAD/10	**Course name:** Introduction to data analysis

Course type, scope and the method:
 Course type: Lecture / Practice
 Recommended course-load (hours):
 Per week: 1 / 1 **Per study period:** 14 / 14
 Course method: present

Number of ECTS credits: 2

Recommended semester/trimester of the course: 1.

Course level: I.

Prerequisities:

Conditions for course completion:
 Test and individual project work.
 Oral presentation of the individual project work.

Learning outcomes:
 To know the basic purpose of statistical data analysis, its methods and statistical thinking and understand its importance for science and practical life.
 To understand elementary statistical concepts.
 To gain experience in handling real data using spreadsheet Excel and statistical software R.

Brief outline of the course:
 1. Introduction (the basic philosophy and aim of statistical data analysis, descriptive and inductive statistics)
 2. Collecting Data (types of data, random sample, randomized experiment)
 3. Handling Data (visualization, summarizing – measures of center, measures of variability, skewness and kurtosis, relationships in data – introduction to regression and correlation)
 4. Statistical inference (elementary view into estimation and testing hypothesis)

Recommended literature:
 1. Anděl, J.: Statistické metody, Matfyzpress, Praha, 1998 (in Czech)
 2. Rossman, A.J. et al.: Workshop Statistics: Discovery with Data and Fathom, 3rd ed. Wiley, 2009
 3. Utts, J.M.: Seeing Through Statistics, 4th ed., Thomson Brooks/Cole, Belmont, 2014
 4. Utts, J.M., Heckard R.F.: Mind on Statistics, 5th ed. Thomson Brooks/Cole, Belmont, 2014
 5. Zvára, K., Štěpán, J.: Pravděpodobnost a matematická statistika, Matfyzpress, Praha, 2001 (in Czech)

Course language:
 Slovak

Notes:

Course assessment					
Total number of assessed students: 328					
A	B	C	D	E	FX
33.54	25.3	28.96	11.28	0.61	0.3

Provides: RNDr. Martina Hančová, PhD.

Date of last modification: 18.09.2020

Approved:

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice	

Faculty: Faculty of Science

Course ID: ÚINF/ UIB1/17	**Course name:** Introduction to information security

Course type, scope and the method:
  Course type: Lecture
  Recommended course-load (hours):
  Per week: 2 **Per study period:** 28
  Course method: present

Number of ECTS credits: 3

Recommended semester/trimester of the course: 3.

Course level: I., N

Prerequisities:

Conditions for course completion:

Learning outcomes:

Brief outline of the course:

Recommended literature:

Course language:

Notes:

Course assessment
 Total number of assessed students: 56

A	B	C	D	E	FX
37.5	37.5	14.29	7.14	1.79	1.79

Provides: RNDr. JUDr. Pavol Sokol, PhD.

Date of last modification: 27.03.2019

Approved:

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice	

Faculty: Faculty of Science	

Course ID: ÚINF/ UPR1/15	**Course name:** Introduction to law for informatics

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: 3., 5.

Course level: I.

Prerequisities:

Conditions for course completion:
 Written final exam (score at least 50%)

Learning outcomes:
 To provide theoretical background for studying computer science in general, by giving the necessary knowledge in the Slovak private and public law.

Brief outline of the course:
 (1) Introduction to concepts of law and legal theory
 (2) Introduction to Civil law
 (3) Introduction to Commercial law
 (4) Introduction to Labor law
 (5) Introduction to Administrative law
 (6) Introduction to Tax law
 (7) Introduction to criminal law

Recommended literature:
 (1) Selected slovak legislation

Course language:

Notes:

Course assessment
 Total number of assessed students: 12

A	B	C	D	E	FX
25.0	16.67	16.67	16.67	25.0	0.0

Provides: RNDr. JUDr. Pavol Sokol, PhD.

Date of last modification: 14.01.2020

Approved:

University: P. J. Šafárik University in Košice	

Faculty: Faculty of Science	

Course ID: ÚINF/ USU/19	**Course name:** Introduction to machine learning

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: 3.

Course level: I.

Prerequisities:

Conditions for course completion:
The realization of a project focused on the application of machine learning algorithms. Successful completion of the written and oral exam.

Learning outcomes:
Theoretical knowledge in the area of machine learning. Basic concepts of machine learning. Basic machine learning algorithms.

Brief outline of the course:
1. Basic concepts of machine learning.
2. Basic characteristics of data, types of attributes, characteristics for individual attributes, dependence between attributes.
3. Data sources and their acquisition. Determining the target task.
4. Preparation and cleaning of data, missing values, incorrect inputs.
5. Classification tasks
6. Selected classification methods
7. Evaluation of models - true positive, false positive, true negative, false negative examples.
8. Classification accuracy indicators.
9. Cluster analysis.
10. Association rules.
11. Prediction tasks and selected prediction methods
12. Prediction accuracy indicators.

Recommended literature:
1. AGGARWAL, Charu C. Data mining: a textbook. Cham: Springer, 2015. ISBN 978-3-319-14141-1.
2. ALPAYDIN, Ethem. Introduction to machine learning. 2nd ed. Massachusetts: MIT Press, c2010. ISBN 978-0-262-01243-0.
3. WITTEN, I. H., Eibe FRANK a Mark A. HALL. Data mining: practical machine learning tools and techniques. 3rd ed. Amsterdam: Morgan Kaufmann, 2011. Morgan Kaufman series in data management systems. ISBN 978-0-12-374856-0.

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: 0

A	B	C	D	E	FX
0.0	0.0	0.0	0.0	0.0	0.0

Provides: doc. Ing. Norbert Kopčo, PhD., RNDr. Ľubomír Antoni, PhD.

Date of last modification: 26.08.2021

Approved:

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice	

Faculty: Faculty of Science	

Course ID: ÚINF/ UNS1/15	Course name: Introduction to neural networks

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: 5.

Course level: I., II.

Prerequisities:

Conditions for course completion:
The condition for passing the course is the realization of a project with the application of neural networks, successful completion of two written tests in the field of neural networks and genetic algorithms, as well as successful completion of the written and oral part of the exam.

Learning outcomes:
The result of the education is an understanding of the basic principles of neural networks and genetic algorithms. The student will gain the ability to apply the acquired knowledge in intelligent data analysis and also work with a selected tool for modeling neural networks.

Brief outline of the course:
1. Basic concept arising from biology. Linear threshold units, polynomial threshold units, functions calculable by threshold units.
2. Perceptrons. Linear separable objects, adaptation process (learning), convergence of perceptron learning rule, higher order perceptrons.
3. Forward neural networks, hidden neurons, adaptation process (learning), backpropagation method.
4. Recurrent neural networks. Hopfield neural networks, properties, associative memory model, energy function, learning, optimization problems (business traveler problem).
5. Model of gradually 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: 439

A	B	C	D	E	FX
14.12	17.08	22.55	19.13	22.78	4.33

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

Date of last modification: 26.08.2021

Approved:

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice	

Faculty: Faculty of Science	

Course ID: ÚINF/ UIN1/15	**Course name:** Introduction to study of informatics

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: 1.

Course level: I.

Prerequisities:

Conditions for course completion:

Learning outcomes:

Brief outline of the course:

Recommended literature:

Course language:

Notes:

Course assessment
 Total number of assessed students: 284

A	B	C	D	E	FX
43.31	17.25	13.38	8.45	3.17	14.44

Provides: prof. RNDr. Stanislav Krajči, PhD., doc. RNDr. Ondrej Krídlo, PhD.

Date of last modification: 03.05.2015

Approved:

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice	

Faculty: Faculty of Science	

Course ID: ÚMV/ LCO/10	**Course name:** Linear and integer programming

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: 3.

Course level: I.

Prerequisities: ÚMV/ALGa/10

Conditions for course completion:
 Two tests, using software CASSIM, oral exam

Learning outcomes:
 To learn the solving methods of linear programming

Brief outline of the course:
 Formulation of linear and integer programs. Graphic solution. Simplex method, its variants and finiteness. Duality and its economic interpretation. Sensitivity analysis and parametric programming. Algorithms for integer programming.

Recommended literature:
 Ch. Papadimitriou – K. Steiglitz: Combinatorial Optimization: Algorithms and Complexity, 1984
 R.J. Vanderbei, Linear Programming:Foundations and Extentions (Kluwer 2001), electronic version: http://www.princeton.edu/~rvdb/LPbook/

Course language:
 Slovak

Notes:

Course assessment
 Total number of assessed students: 128

A	B	C	D	E	FX
21.88	16.41	20.31	22.66	18.75	0.0

Provides: prof. RNDr. Katarína Cechlárová, DrSc., RNDr. Andrej Gajdoš, PhD.

Date of last modification: 03.05.2015

Approved:

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice	

Faculty: Faculty of Science	

Course ID: ÚINF/ LOP1/15	**Course name:** Logic programming

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., II.

Prerequisities:

Conditions for course completion:

Learning outcomes:
 To learn bases of declarative programming (as complementary method to procedural programming) and basic methods of implementations of logic programming languages.

Brief outline of the course:
 Facts and rules in Prolog. Unification of terms (Robinson's unification algorithm). Recursion and backtrack in Prolog. Computational step and computational tree. Classification of terms. Lists. Functors and operators in composed terms. Predicates for input and output. Dynamic database. Cycles (repeat-fail, for). Predicates related to backtrack. Cut. Predicates evaluating of arithmetic expressions.

Recommended literature:
 Bratko, I.: Prolog – programming for artificial intelligence, third edition. Addison-Wesley, 2001
 Nilsson U., Maluszynski J.: Logic, Programming and Prolog, John Wiley & Sons Ltd. 1995
 Nienhuys-Cheng Sh.H., Wolf R.: Foundations of Inductive Logic Programming, Springer-Verlag, 1997

Course language:

Notes:

Course assessment
 Total number of assessed students: 284

A	B	C	D	E	FX
22.18	12.68	14.08	24.3	25.0	1.76

Provides: doc. RNDr. Ondrej Krídlo, PhD., prof. RNDr. Stanislav Krajči, PhD.

Date of last modification: 03.05.2015

Approved:

COURSE INFORMATION LETTER

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

Course ID: ÚINF/ MIS/15	**Course name:** Management of information systems

Course type, scope and the method:
  Course type: Lecture / Practice
  Recommended course-load (hours):
  Per week: 1 / 2 **Per study period:** 14 / 28
  Course method: present

Number of ECTS credits: 4

Recommended semester/trimester of the course: 4.

Course level: I.

Prerequisities:

Conditions for course completion:

Learning outcomes:

Brief outline of the course:

Recommended literature:

Course language:

Notes:

Course assessment
 Total number of assessed students: 21

A	B	C	D	E	FX
19.05	42.86	14.29	19.05	0.0	4.76

Provides: prof. RNDr. Gabriel Semanišin, PhD., MSc. Terézia Mézešová

Date of last modification: 22.05.2018

Approved:

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice

Faculty: Faculty of Science

Course ID: ÚMV/ MSW/10	Course name: Mathematical software

Course type, scope and the method:
 Course type: Lecture / Practice
 Recommended course-load (hours):
 Per week: 1 / 2 Per study period: 14 / 28
 Course method: present

Number of ECTS credits: 3

Recommended semester/trimester of the course: 2.

Course level: I.

Prerequisities:

Conditions for course completion:
 Tests from both Excel and Maple
 Given at the basis of partial tests.

Learning outcomes:
 To develop student's knowledge and skills to use numerical and grafical representations of data and modelling by solving of various types of mathematical problems in different mathematical environments – environment of spreadsheet, R language or environment of system of symbolic calculations Maple.

Brief outline of the course:
 The creation and use of formulas with mathematical functions, graphical and numerical solving of equations and systems of equations, utilize of arithmetical, graphical and stochastic models by solving of mathematical problems, linear optimalization. Basic description of Maple software and R language, manipulation with matrices and vectors, working with data and data files. Basic programming techniques, creation of user functions and scripts, graphical possibilities for data visualization. Manipulations of mathematical expressions, finding solutions of equalities and inequalities, mathematical analysis, linear algebra, number, graph and set theory in Maple.

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: 162					
A	B	C	D	E	FX
20.37	21.6	25.31	21.6	8.02	3.09

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

Date of last modification: 26.03.2019

Approved:

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice	

Faculty: Faculty of Science	

Course ID: ÚMV/ MST/19	**Course name:** Mathematical statistics

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: 5.

Course level: I., II.

Prerequisities:

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:
Student should obtain the knowledge about basic statistical methods and the ability to apply theoretical knowledge in practical problems solving.

Brief outline of the course:
Random vectors, their distributions and characteristics. Joint and marginal distributions. Correlation and regression, properties of correlation coefficient. Random sample, sampling distributions and characteristics. Some important statistics and their distributions. Point estimators and their properties. Maximum likelihood method. Interval estimates, confidence interval construction.Testing of statistical hypothesis, critical region, level of significance. Methods for searching optimal critical regions. Some important parametric and nonparametric tests.

Recommended literature:
1. Skřivánková V.: Pravdepodobnosť v príkladoch, UPJŠ, Košice, 2006 (in Slovak)
2. Skřivánková V.-Hančová M.: Štatistika v príkladoch, UPJŠ, Košice, 2005 (in Slovak)
3. CASELLA, G., BERGER, R., Statistical Inference, 2nd ed., Duxbury Press, 2002
4. DeGroot, M. H., Schervish, M. J.: Probability and Statistics, 4th ed., Pearson, Boston, 2012
5. Utts, J.M., Heckard, R.F.: Mind od Statistics, 5th ed., Thomson Brooks/Cole, 2014
6. Anděl J.: Základy matematické statistiky, MatfyzPress, Praha, 2011 (in Czech)

Course language:
Slovak

Notes:

Course assessment
Total number of assessed students: 125

A	B	C	D	E	FX
20.8	21.6	15.2	21.6	13.6	7.2

Provides: RNDr. Martina Hančová, PhD.
Date of last modification: 18.03.2019
Approved:

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice	

Faculty: Faculty of Science

Course ID: ÚMV/ MAP/19	**Course name:** Matrix calculus

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: 3.

Course level: I.

Prerequisities: ÚMV/ALGa/10 and leboÚMV/ALG3b/10

Conditions for course completion:
 Exam

Learning outcomes:
 Mastering modern algebraic methods of applied mathematics.

Brief outline of the course:
Basic course of linear algebra is needed for mastering this course. Contents: Decompositions of matrices and their properties, eigenvalues and eigenvectors, trace of a matrix. Special matrices and their properties – symmetric, orthogonal, idempotent, toeplitz, positive definite and semidefinite, partitioned matrices. Inverse and pseudoinverse matrices. Linear space generated by the columns of a matrix, geometry of the spece of matrices, orthogonal projectors. Special matrix products and operators of vectorization, permutation and commutation matrices.

Recommended literature:
 1. Seber, G.A.F.: A matrix handbook for statisticians. John Wiley & Sons, 2008
 2. Searle, S.R., Khuri, A.I.: Matrix algebra useful for statistics. John Wiley & Sons, 2017.
 3. Meyer, C.D.: Matrix Analysis and applied linear algebra. SIAM, 2000

Course language:
 Slovak and English

Notes:

Course assessment
 Total number of assessed students: 0

A	B	C	D	E	FX
0.0	0.0	0.0	0.0	0.0	0.0

Provides: prof. RNDr. Ivan Žežula, CSc., RNDr. Daniel Klein, PhD.

Date of last modification: 28.03.2019

Approved:

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice	

Faculty: Faculty of Science	

Course ID: ÚMV/ ADI/19	**Course name:** Methods of data analysis and artificial intelligence

Course type, scope and the method:
 Course type:
 Recommended course-load (hours):
 Per week: Per study period:
 Course method: present

Number of ECTS credits: 2

Recommended semester/trimester of the course:

Course level: I.

Prerequisities: ÚMV/MST/19,ÚMV/LCO/10,ÚINF/USU/19,ÚMV/FRPb/19,ÚINF/UNS1/15

Conditions for course completion:
 Acquiring the required number of credits in the structure defined by the study plan.

Learning outcomes:
 Evaluation of student's competences with respect to the profile of the graduate.

Brief outline of the course:
The state examination is performed in a form of a debate with the emphasis on one topic of the following courses:ÚMV/FRPb/19, ÚMV/LCO/10, ÚMV/MST/19, ÚINF/USU/19 and ÚINF/UNS1/15:
1. Differential calculus and its applications.
2. Integral calculus and its applications.
3. Linear programming problems, solution methods and complexity.
...
7. Basic characteristics of data, types of attributes, characteristics for individual attributes, dependence between attributes.
8. Classification models - decision trees, k-nearest neighbors and others. Prediction models.
9. Basic models of computational units - neurons (linear threshold gates, polynomial threshold gates, perceptrons).
10. Genetic and evolution algorithms.

Recommended literature:

Course language:
 slovak

Notes:

Course assessment
 Total number of assessed students: 0

A	B	C	D	E	FX
0.0	0.0	0.0	0.0	0.0	0.0

Provides:

Date of last modification: 29.03.2019
Approved:

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice	

Faculty: Faculty of Science	

Course ID: ÚFV/ NOT1a/03	**Course name:** Nontraditional Optimization Techniques I

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: 5.

Course level: I., II.

Prerequisities:

Conditions for course completion:
 Monitoring progress in solving applied projects.
 examination (50%), quality of the project (50%)
 examination

Learning outcomes:
 To familiarize students with biologically and physically inspired optimization, simulation and prediction techniques. To expand students' creativity and programming skills by applying heuristic techniques in solving applied problems.

Brief outline of the course:
 Fundamentals of optimization theory. Basic optimization problems. Basic types of objective functions. Classification of optimization techniques. Gradient-based optimization techniques. Evolutionary algorithms. Genetic algorithms. Genetic algorithms as Markov processes. Statistical Mechanics Approximations of Genetic Algorithms. Monte Carlo simulation and simulated annealing. Swarm optimization. Cellular Automata and their applications in simulations of complex systems. Fractals. Agent-based models. Evolutionary games. Evolution of cooperation. Fundamentals of Neural Networks. Application of singular value decomposition to solve least squares problems.

Recommended literature:
 Hartmann, A. K., Rieger, H., Optimization Algorithms in Physics, Wiley, 2002
 Reeves, C. R., Rowe, J. E., Genetic Algorithms: Principles and perspectives, Kluwer, 2003
 Mitchell, M., Complexity. A Guided Tour, Oxford University Press, 2009
 Solé, R. V., Phase Transitions, Princeton University Press, 2011
 Ilachinski, A., Cellular Automata. A Discrete universe, World Scientific, 2002
 Haykin, S., Neural Networks. A Comprehensive Foundation, Prentice-Hall, 1999

Course language:

Notes:

Course assessment					
Total number of assessed students: 85					
A	B	C	D	E	FX
69.41	16.47	8.24	2.35	3.53	0.0
Provides: doc. RNDr. Jozef Uličný, CSc.					
Date of last modification: 03.05.2015					
Approved:					

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice

Faculty: Faculty of Science

Course ID: ÚFV/ NOT1b/03	Course name: Nontraditional Optimization Techniques II

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., II.

Prerequisities:

Conditions for course completion:
 Presentation of the project in written form. Oral exam and discussion of the presented project. Should corona-virus quarantine persist, written report and answer to posed questions suffice.

Learning outcomes:
 By using examples from the biology to learn applications of optimization techniques on study and interpretation of complex systems. Introduction to new paradigms in the area of systems biology, including parasite/host coevolution.

Brief outline of the course:
 Complex systems, emergent behavior. Evolutionary theory and memetics. Application of optimization techniques on complex systems. Application of methods /genetic algorithms, simulated annealing, taboo search/ on selected problems of biomolecular simulations. Molecular dynamics, protein folding. Population dynamics, metabolic networks and complexity in bioinformatics.

Recommended literature:
 The actual scientific papers.

Course language:

Notes:

Course assessment
 Total number of assessed students: 50

A	B	C	D	E	FX
88.0	4.0	6.0	2.0	0.0	0.0

Provides: doc. RNDr. Jozef Uličný, CSc.

Date of last modification: 27.03.2020

Approved:

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice	

Faculty: Faculty of Science	

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

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/FRPb/19,(ÚMV/ALG1b/10 and leboÚMV/ALG2b/10 and leboÚMV/ALG3b/10)

Conditions for course completion:
Form: Standard lectures. Exercises using computers. Solving problems and programming algorithms using the platform SageMath (including NumPy, SciPy, SymPy, R, Maxima, matplotlib, GAP, FLINT, and many other packages).
Interim evaluation: Individual solving of given tasks in the form of implementation of algorithms or their parts, modification of existing algorithms or use of available packages to solve real problems. Consisting 60% of the overall evaluation.
Final examination: consisting of a written (simple examples and a test) and oral exam with 20/20 proportion.

Learning outcomes:
After completing the course, the student will acquire theoretical and practical knowledge of the 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 / practical) 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:

Notes:

Course assessment
Total number of assessed students: 0

A	B	C	D	E	FX
0.0	0.0	0.0	0.0	0.0	0.0

Provides: prof. RNDr. Mirko Horňák, CSc., Mgr. Jozef Kiseľák, PhD.

Date of last modification: 27.03.2019

Approved:

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice

Faculty: Faculty of Science

Course ID: ÚFV/ IFY1a/01	**Course name:** Physics for Informaticists I

Course type, scope and the method:
 Course type: Lecture
 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: 3.

Course level: I.

Prerequisities:

Conditions for course completion:
 Two written tests.
 Two written tests.

Learning outcomes:

Brief outline of the course:
 Anotation of the lectures – Physics for informaticists I:
 Analysis of functions and properties of basic analog and digital electronic elements, circuits, and systems for transmission and processing of informations – transistors, operating amplifiers, combinational and sequence logic circuits, analog to digital and digital to analog converters.

Recommended literature:
 1. Delaney C.F.G.: Electronics for the Physicist with Aplications. John Willey & Sons, New York, 1980.
 2. Garcia N., Damask A., Schwarz S.: Physics for Computer Science Students – with Emphasis on Atomic and Semiconductor Physics. Second Edition. Springer-Verlag, New-York, Berlin, 1998.
 3. Howatson A. M.: Electrical Circuits and Systems. An Introduction for Engineers and Physical Scientists. Oxford University Press, Oxford, 1996.

Course language:

Notes:

Course assessment
 Total number of assessed students: 104

A	B	C	D	E	FX
23.08	29.81	19.23	8.65	0.0	19.23

Provides: doc. RNDr. Ján Füzer, PhD.

Date of last modification: 03.05.2015

Approved:

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice	

Faculty: Faculty of Science	

Course ID: ÚFV/ IFY/09	**Course name:** Physics for Informatics

Course type, scope and the method:
 Course type: Lecture
 Recommended course-load (hours):
 Per week: 2 **Per study period:** 28
 Course method: present

Number of ECTS credits: 3

Recommended semester/trimester of the course: 5.

Course level: I.

Prerequisities:

Conditions for course completion:
 Two written tests.
 Combination of the results of two tests.

Learning outcomes:
 Introduction to classical and modern physics.

Brief outline of the course:
 The lecture provides an introduction to classical and modern physics, the basics of magnetism and magnetic recording. Popular form explain the theory of relativity, quantum physics and Maxwell's equations.

Recommended literature:
 J. B. Seaborn, Understanding the Universe: An Introduction to Physics and Astrophysics, Springer 1997

Course language:

Notes:

Course assessment
 Total number of assessed students: 116

A	B	C	D	E	FX
32.76	25.86	26.72	12.93	1.72	0.0

Provides: doc. RNDr. Ján Füzer, PhD.

Date of last modification: 03.05.2015

Approved:

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice	

Faculty: Faculty of Science	

Course ID: ÚMV/ POV/10	**Course name:** Practical operations research

Course type, scope and the method:
 Course type: Lecture / Practice
 Recommended course-load (hours):
 Per week: 1 / 2 **Per study period:** 14 / 28
 Course method: present

Number of ECTS credits: 3

Recommended semester/trimester of the course: 6.

Course level: I.

Prerequisities:

Conditions for course completion:
 Based on evaluation of individual projects.

Learning outcomes:
 To provide the basics of mathematical modelling of real-world problems and selected methods of solving the problems of uni- and multicriterial optimization

Brief outline of the course:
 Elements of decision theory, games against nature. Mathematical modelling of real-world problems. Linear and nonlinear models. Multicriterial optimization.

Recommended literature:
 electronic information sources

Course language:
 Slovak

Notes:

Course assessment
Total number of assessed students: 40

A	B	C	D	E	FX
62.5	25.0	7.5	0.0	5.0	0.0

Provides: prof. RNDr. Tomáš Madaras, PhD.

Date of last modification: 03.05.2015

Approved:

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice	

Faculty: Faculty of Science

Course ID: ÚINF/ PBS/15	**Course name:** Pro-seminar to bachelor thesis

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 credits: 1

Recommended semester/trimester of the course: 4.

Course level: I.

Prerequisities:

Conditions for course completion:
 Creating a website about a bachelor's thesis. Selection of bachelor thesis topic. Presentation of the bachelor's thesis assignment and its objectives. Preparation of an essay in the extent of 1 page on the motivation to select a bachelor's thesis. Creation of the bachelor's thesis assignment and its insertion into the AIS by the thesis supervisor.

Learning outcomes:
 Basic knowledge of the principles of creation and structure of bachelor's theses. Criteria and requirements for selecting an appropriate bachelor thesis topic. Knowledge about the structure of the bachelor's thesis assignment.

Brief outline of the course:
 1. Principles in creating a final thesis.
 2. The presentations of bachelor thesis topics by potential supervisors.
 3. The presentations of bachelor thesis topics by potential supervisors.
 4. The presentations of bachelor thesis topics by potential supervisors.
 5. Bachelor thesis and its objectives.
 6. Assignment of bachelor thesis.
 7. Basic types of bachelor theses.
 8. Structure of different types of bachelor theses.
 9. Requirements for final bachelor theses.
 10. External company final theses.
 11. Presentation of selected topics of final theses.
 12. Presentation of selected topics of final theses.
 13. Presentation of selected topics of final theses.

Recommended literature:
 1. STN 01 6910. Rules of writing and editing documents. 2011.
 2. STN ISO 2145. Documentation. Numbering of sections and subsections of written documents. 1997.
 3. STN ISO 690. Information and documentation. Instructions for creating bibliographic references to information sources and their citation. 2012
 4. KATUŠČÁK, Daniel. 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: 307	

abs	n
94.14	5.86

Provides: RNDr. Ľubomír Antoni, PhD.	
Date of last modification: 26.08.2021	
Approved:	

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice	

Faculty: Faculty of Science

Course ID: ÚMV/ TPP/19	**Course 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/10 and leboÚMV/MAN2c/10 and leboÚMV/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, chí-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)

Course language:
Slovak

Notes:

Course assessment
Total number of assessed students: 306

A	B	C	D	E	FX
12.42	14.05	19.28	23.2	22.55	8.5

Provides: RNDr. Daniel Klein, PhD.	
Date of last modification: 11.03.2019	
Approved:	

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice	

Faculty: Faculty of Science	

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

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.

Prerequisities: (ÚINF/PAZ1b/15 and leboÚINF/ePAZ1b/15),ÚINF/DBS1a/15,ÚINF/SWI1a/15

Conditions for course completion:
The assessment includes the continuous evaluation of partial tasks related to complex project solving during semester.
The final evaluation is awarded on the basis of the continuous evaluation and the result of the exam. The exam requires demonstration of the ability to orientate oneself in the lectured issues, mastering the theoretical foundations of process modeling, basic skills for the creation and interpretation of process models. The exam consists of written and oral part.

Learning outcomes:
To get acquainted with the theoretical foundations of process modeling. To master the basic principles of creating process models. To get acquainted with standard languages for process modeling and gain practical experience in creating models using selected modeling tools.

Brief outline of the course:
Introduction to process modeling. Approaches to the development of large software systems. Theoretical foundations of process modeling. Petri nets. Process orchestration. Process choreography. Selected process properties. Process model architectures. 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: 41

A	B	C	D	E	FX
17.07	29.27	21.95	19.51	4.88	7.32

Provides: prof. RNDr. Gabriel Semanišin, PhD.

Date of last modification: 23.02.2021

Approved:

COURSE INFORMATION LETTER

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

Course ID: ÚINF/ OP/14	**Course name:** Professional experience

Course type, scope and the method:
  Course type: Practice
  Recommended course-load (hours):
  Per week: Per study period: 2t
  Course method: present

Number of ECTS credits: 2

Recommended semester/trimester of the course: 3., 5.

Course level: I.

Prerequisities:

Conditions for course completion:

Learning outcomes:

Brief outline of the course:

Recommended literature:

Course language:

Notes:

Course assessment
 Total number of assessed students: 10

abs	n
100.0	0.0

Provides: Mgr. Alexander Szabari, PhD., Ing. Miron Kuzma, PhD.

Date of last modification: 03.05.2015

Approved:

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice	

Faculty: Faculty of Science	

Course ID: ÚINF/ PSW1/06	**Course name:** Programming of web-pages

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.

Prerequisities: (ÚINF/DBS1a/15 and leboÚINF/DBS/15),ÚINF/PAZ1a/15

Conditions for course completion:
 50% of the marks from continuous assignments

Learning outcomes:
 An overview of modern technologies for creating dynamic websites. Describing and appliyng the basic principles of creating dynamic web pages. Utilize client-side (JavaScript) and server-side (PHP) web programming technologies. Using relational databases (MySQL) to create application web pages. Know the security risks of dynamic websites and be able to eliminate them.

Brief outline of the course:
 1. JavaScript - introduction to JavaScript programming.
 2. JavaScript - communication with the user, validation of data in forms using JavaScript.
 3. JavaScript - introduction to using the jQuery library.
 4. PHP - introduction to PHP programming.
 5. PHP - data and control structures of the PHP language.
 6. PHP - communication with the user, validation of data in forms using PHP.
 7. PHP - object oriented problem solving in PHP language. File manipulation.
 8. PHP - User authentication (cookies, session).
 9. MySQL - introduction to working with MySQL database system.
 10. MySQL - Simple applications using the database for data storage and access.
 11. Web application security - an introduction to web application security.
 12. Web application security - the most common web application security problems and how to eliminate them.

Recommended literature:
 BLUM, Richard. PHP, MySQL& JavaScript: All-in-One. Hoboken, New Jersey: John Wiley, 2018. ISBN 978-1-119-46838-7.
 KROMANN, Frank M. Beginning PHP and MySQL: From Novice to Professional. 5. CA, USA: Apress, 2018. ISBN 978-1-4302-6043-1.
 HUSEBY, Sverre H. Zranitelný kód. Brno: Computer Press, 2006, 207 s. ISBN 80-251-1180-6.
 SNYDER, Chris, Thomas MYER a Michael SOUTHWELL. Pro PHP Security: From Application Security Principles to the Implementation of XSS Defenses. 2. United States of America: Apress, 2010. ISBN 978-1-4302-3318-3.

Course language:			
Slovak language, knowledge of English language is only necessary for reading documentation.			

Notes:			
Content prerequisite: WBdi/15 Web and user interface design			

Course assessment
Total number of assessed students: 23

abs	n	neabs	z
65.22	34.78	0.0	0.0

Provides: PaedDr. Ján Guniš, PhD.

Date of last modification: 31.08.2021

Approved:

COURSE INFORMATION LETTER

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 and the method:
 Course type: Lecture / Practice
 Recommended course-load (hours):
 Per week: 3 / 4 **Per study period:** 42 / 56
 Course method: present

Number of ECTS credits: 8

Recommended semester/trimester of the course: 1.

Course level: I., II.

Prerequisities:

Conditions for course completion:
 Graded activities during semester: assignments, small exams, midterm, final project.
 Final examination: practical finalterm focused on a complex task.
 Rules to pass the subject: Pass the minimal limit of points for category of homeworks (assignments, final project) and tests (small exams, midterm). Get at least 42% from the finalterm and pass the defined limit of total points for all graded activities.

Learning outcomes:
 Get an ability to implement basic Java programs and obtain essential knowledge related to object-oriented programming.

Brief outline of the course:
 1. Introduction to Java and JPAZ2 framework, first Eclipse project, interactive communication with objects using turtle graphics, repeating code in loops, notion of class, object, and method.
 2. For-loops, local variables, variable types, arithmetic expressions, random numbers, random walk, conditions.
 3. While-loop, returning 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 algorithms, two-dimensional array.
 7. Exceptions and exception handling, files and directories, writing to text files.
 8. Reading from text files.
 9. Creating classes, encapsulation, getters and setters, constructors and their hierarchy, method overloading.
 10. Inheritance and polymorphism.
 11. Java Collections Framework, ArrayList class, wrapper classes for primitive types and autoboxing, interfaces List, Set, Map and their implementations, methods equals and hashCode.
 12. Access modifiers, abstract classes and methods, creating and implementing interfaces, sorting, static methods and variables.
 13. Creating and throwing exceptions, checked and runtime exceptions, JavaDoc, Maven.

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: 717

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

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

Date of last modification: 31.08.2021

Approved:

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice

Faculty: Faculty of Science

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

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., II.

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: 1222

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

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

Date of last modification: 31.08.2021

Approved:

COURSE INFORMATION LETTER

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

Course ID: ÚINF/ PDA/19	**Course name:** Project DA I

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: 4

Recommended semester/trimester of the course: 4.

Course level: I.

Prerequisities:

Conditions for course completion:

Learning outcomes:

Brief outline of the course:

Recommended literature:

Course language:

Notes:

Course assessment
 Total number of assessed students: 0

A	B	C	D	E	FX
0.0	0.0	0.0	0.0	0.0	0.0

Provides: RNDr. Erik Bruoth, PhD.

Date of last modification: 29.03.2019

Approved:

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice

Faculty: Faculty of Science

Course ID: ÚMV/ PDAb/19	Course name: Project of data analysis II

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: 4

Recommended semester/trimester of the course: 5.

Course level: I.

Prerequisities:

Conditions for course completion:
Activity at the practise session. Homeworks. Presentation of applied methods and obtained results for the considered problem.

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: 0

A	B	C	D	E	FX
0.0	0.0	0.0	0.0	0.0	0.0

Provides: Mgr. Katarína Lučivjanská, PhD.

Date of last modification: 26.03.2019
Approved:

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice	

Faculty: Faculty of Science

Course ID: KPPaPZ/Ps/15	**Course name:** Psychology

Course type, scope and the method:
 Course type: Lecture
 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: 1.

Course level: I., II.

Prerequisities:

Conditions for course completion:

Learning outcomes:

Brief outline of the course:

Recommended literature:

Course language:

Notes:

Course assessment
 Total number of assessed students: 517

A	B	C	D	E	FX
22.82	16.05	21.66	18.57	17.99	2.9

Provides: PhDr. Anna Janovská, PhD., Mgr. Ondrej Kalina, PhD.

Date of last modification: 28.06.2021

Approved:

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice	

Faculty: Faculty of Science

Course ID: ÚTVŠ/ ÚTVŠ/CM/13	**Course name:** Seaside Aerobic Exercise

Course type, scope and the method:
 Course type: Practice
 Recommended course-load (hours):
 Per week: Per study period: 36s
 Course method: combined, present

Number of ECTS credits: 2

Recommended semester/trimester of the course:

Course level: I., II.

Prerequisities:

Conditions for course completion:
 Conditions for course completion:
 Attendance

Learning outcomes:
 Learning outcomes:
 Students will be provided an overview of possibilities how to spend leisure time in seaside conditions actively and their skills in work and communication with clients will be improved. Students will acquire practical experience in organising the cultural and art-oriented events, with the aim to improve the stay and to create positive experiences for visitors.

Brief outline of the course:
 Brief outline of the course:
 1. Basics of seaside aerobics
 2. Morning exercises
 3. Pilates and its application in seaside conditions
 4. Exercises for the spine
 5. Yoga basics
 6. Sport as a part of leisure time
 7. Application of projects of productive spending of leisure time for different age and social groups (children, young people, elderly)
 8. Application of seaside cultural and art-oriented activities in leisure time

Recommended literature:

Course language:

Notes:

Course assessment
 Total number of assessed students: 41

abs	n
12.2	87.8

Provides: Mgr. Agata Horbacz, PhD.
Date of last modification: 15.03.2019
Approved:

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice	

Faculty: Faculty of Science	

Course ID: ÚFV/ TMS/10	**Course name:** Secrets of microworld

Course type, scope and the method:
 Course type: Lecture
 Recommended course-load (hours):
 Per week: 2 **Per study period:** 28
 Course method: present

Number of ECTS credits: 3

Recommended semester/trimester of the course: 4., 6.

Course level: I.

Prerequisities:

Conditions for course completion:
 term project

Learning outcomes:
 To give a review of the recent results form the elementary particle physics for non-physicists layman level.

Brief outline of the course:
 Introduction to the topics. Atom, nucleus and the basic forces in Nature. Quarks and classification of elementary particles. Methods and approaches in micro objects research. Contenporary experiments un subnuclear physics - BNL, CERN, JINR Dubna.

Recommended literature:
 1.Frank Close: The cosmic onion, Heinemann Educational Books Ltd, 1990
 2. Ljubimov A., Kiss D.: Vvedenie v experimentaľnuju fiziku častic, Dubna, 1999
 3. J.Žáček: Úvod do fyziky elementárních částic, Karolinum, Praha, 2005
 4. R. Mackintosh et al. : Jádro - cesta do srdce hmoty, Academia, Praha, 2003

Course language:
 slovak

Notes:

Course assessment
 Total number of assessed students: 67

A	B	C	D	E	FX
73.13	16.42	10.45	0.0	0.0	0.0

Provides: prof. RNDr. Stanislav Vokál, DrSc., doc. RNDr. Janka Vrláková, PhD.

Date of last modification: 03.05.2015

Approved:

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice	
Faculty: Faculty of Science	
Course ID: ÚMV/ VMA/19	**Course name:** Selected topics on mathematical analysis

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: 4

Recommended semester/trimester of the course: 6.

Course level: I., II.

Prerequisities: ÚMV/FRPb/19

Conditions for course completion:
 Final evaluation is given by continuous assessment.

Learning outcomes:
Expand the knowledge of mathematical analysis needed to deepen understanding of machine learning and artificial intelligence.

Brief outline of the course:
1. Vector (linear) space - examples of infinite-dimensional spaces (spaces of sequences and functions).
2. Metric space (MS) - metric, convergence of sequences, closure and interior of a set, completeness and compactness of MP, Banach fixed-point theorem.
3. Normed linear space (NLS) - norm, Banach spaces, relation to MS, dual spaces, Hölder, Minkowski inequality.
4. Space with scalar product - unitary and Hilbert spaces, Cauchy-Schwartz inequality, Pythagorean theorem, parallelogram rule, relation to LNP, orthogonal projections.
6. Operators (functionals) in NLP - linearity, continuity, boundedness, adjointness.

Recommended literature:
1. N. Katzourakis, E. Varvaruca, An illustrative introduction to modern analysis. Boca Raton, FL:CRC Press (2018)
2. A. M. Bruckner, J. B. Bruckner, B. S. Thomson, Real analysis, 2nd. ed., ISBN 1434844129, 2008
3. Taylor, A.: Úvod do funkcionální analýzy, Academia 1973.
4. Kolmogorov, A., Fomin, S.: Základy teórie funkcí a funkcionální analýzy, 1975.
5. S. Lang, Undegraduate Analysis, Springer, 1997.

Course language:
 Slovak

Notes:

Course assessment Total number of assessed students: 1					
A	B	C	D	E	FX
100.0	0.0	0.0	0.0	0.0	0.0

Provides: doc. RNDr. Ondrej Hutník, PhD., Mgr. Jozef Kiseľák, PhD.

Date of last modification: 27.03.2019

Approved:

COURSE INFORMATION LETTER

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

Course ID: ÚTVŠ/ TVa/11	**Course name:** Sports Activities I.

Course type, scope and the method:
 Course type: Practice
 Recommended course-load (hours):
 Per week: 2 **Per study period:** 28
 Course method: combined, present

Number of ECTS credits: 2

Recommended semester/trimester of the course: 1.

Course level: I., I.II., II.

Prerequisities:

Conditions for course completion:
 Min. 80% of active participation in classes.

Learning outcomes:
 Sports activities in all their forms prepare university students for their professional and personal life. They have a great impact on physical fitness and performance. Specialization in sports activities enables students to strengthen their relationship towards the selected sport in which they also improve.

Brief outline of the course:
 Brief outline of the course:
 Within the optional subject, the Institute of Physical Education and Sports of Pavol Jozef Šafárik University provides for students the following sports activities: aerobics, aikido, basketball, badminton, body form, bouldering, floorball, yoga, power yoga, pilates, swimming, body-building, indoor football, S-M systems, step aerobics, table tennis, tennis, volleyball and chess.
 In the first two semesters of the first level of education students will master basic characteristics and particularities of individual sports, motor skills, game activities, they will improve level of their physical condition, coordination abilities, physical performance, and motor performance fitness. Last but not least, the important role of sports activities is to eliminate swimming illiteracy and by means of a special program of medical physical education to influence and mitigate unfitness.
 In addition to these sports, the Institute offers for those who are interested winter and summer physical education trainings with an attractive program and organises various competitions, either at the premises of the faculty or University or competitions with national or international participation.

Recommended literature:

Course language:

Notes:

Course assessment Total number of assessed students: 12859							
abs	abs-A	abs-B	abs-C	abs-D	abs-E	n	neabs
87.01	0.08	0.0	0.0	0.0	0.04	8.1	4.77

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

Date of last modification: 13.05.2021

Approved:

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice	

Faculty: Faculty of Science

Course ID: ÚTVŠ/ TVb/11	**Course name:** Sports Activities II.

Course type, scope and the method:
 Course type: Practice
 Recommended course-load (hours):
 Per week: 2 **Per study period:** 28
 Course method: combined, present

Number of ECTS credits: 2

Recommended semester/trimester of the course: 2.

Course level: I., I.II., II.

Prerequisities:

Conditions for course completion:
active participation in classes - min. 80%.

Learning outcomes:
Sports activities in all their forms prepare university students for their professional and personal life. They have a great impact on physical fitness and performance. Specialization in sports activities enables students to strengthen their relationship towards the selected sport in which they also improve.

Brief outline of the course:
Within the optional subject, the Institute of Physical Education and Sports of Pavol Jozef Šafárik University provides for students the following sports activities: aerobics, aikido, basketball, badminton, body form, bouldering, floorball, yoga, power yoga, pilates, swimming, body-building, indoor football, S-M systems, step aerobics, table tennis, tennis, volleyball and chess.
In the first two semesters of the first level of education students will master basic characteristics and particularities of individual sports, motor skills, game activities, they will improve level of their physical condition, coordination abilities, physical performance, and motor performance fitness. Last but not least, the important role of sports activities is to eliminate swimming illiteracy and by means of a special program of medical physical education to influence and mitigate unfitness.
In addition to these sports, the Institute offers for those who are interested winter and summer physical education trainings with an attractive program and organises various competitions, either at the premises of the faculty or University or competitions with national or international participation.

Recommended literature:

Course language:

Notes:

Course assessment
Total number of assessed students: 11675

abs	abs-A	abs-B	abs-C	abs-D	abs-E	n	neabs
84.52	0.56	0.02	0.0	0.0	0.05	10.63	4.22

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

Date of last modification: 13.05.2021

Approved:

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice	

Faculty: Faculty of Science

Course ID: ÚTVŠ/ TVc/11	**Course name:** Sports Activities III.

Course type, scope and the method:
 Course type: Practice
 Recommended course-load (hours):
 Per week: 2 **Per study period:** 28
 Course method: combined, present

Number of ECTS credits: 2

Recommended semester/trimester of the course: 3.

Course level: I., I.II., II.

Prerequisities:

Conditions for course completion:
min. 80% of active participation in classes

Learning outcomes:
Sports activities in all their forms prepare university students for their professional and personal life. They have a great impact on physical fitness and performance. Specialization in sports activities enables students to strengthen their relationship towards the selected sport in which they also improve.

Brief outline of the course:
Within the optional subject, the Institute of Physical Education and Sports of Pavol Jozef Šafárik University provides for students the following sports activities: aerobics, aikido, basketball, badminton, body form, bouldering, floorball, yoga, power yoga, pilates, swimming, body-building, indoor football, S-M systems, step aerobics, table tennis, tennis, volleyball and chess.
In the first two semesters of the first level of education students will master basic characteristics and particularities of individual sports, motor skills, game activities, they will improve level of their physical condition, coordination abilities, physical performance, and motor performance fitness. Last but not least, the important role of sports activities is to eliminate swimming illiteracy and by means of a special program of medical physical education to influence and mitigate unfitness.
In addition to these sports, the Institute offers for those who are interested winter and summer physical education trainings with an attractive program and organises various competitions, either at the premises of the faculty or University or competitions with national or international participation.

Recommended literature:

Course language:

Notes:

Course assessment
Total number of assessed students: 7873

abs	abs-A	abs-B	abs-C	abs-D	abs-E	n	neabs
88.8	0.05	0.01	0.0	0.0	0.03	4.08	7.04

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

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice	

Faculty: Faculty of Science

Course ID: ÚTVŠ/ TVd/11	**Course name:** Sports Activities IV.

Course type, scope and the method:
 Course type: Practice
 Recommended course-load (hours):
 Per week: 2 **Per study period:** 28
 Course method: combined, present

Number of ECTS credits: 2

Recommended semester/trimester of the course: 4.

Course level: I., I.II., II.

Prerequisities:

Conditions for course completion:
min. 80% of active participation in classes

Learning outcomes:
Sports activities in all their forms prepare university students for their professional and personal life. They have a great impact on physical fitness and performance. Specialization in sports activities enables students to strengthen their relationship towards the selected sport in which they also improve.

Brief outline of the course:
Within the optional subject, the Institute of Physical Education and Sports of Pavol Jozef Šafárik University provides for students the following sports activities: aerobics, aikido, basketball, badminton, body form, bouldering, floorball, yoga, power yoga, pilates, swimming, body-building, indoor football, S-M systems, step aerobics, table tennis, tennis, volleyball and chess.
In the first two semesters of the first level of education students will master basic characteristics and particularities of individual sports, motor skills, game activities, they will improve level of their physical condition, coordination abilities, physical performance, and motor performance fitness. Last but not least, the important role of sports activities is to eliminate swimming illiteracy and by means of a special program of medical physical education to influence and mitigate unfitness.
In addition to these sports, the Institute offers for those who are interested winter and summer physical education trainings with an attractive program and organises various competitions, either at the premises of the faculty or University or competitions with national or international participation.

Recommended literature:

Course language:

Notes:

Course assessment
Total number of assessed students: 5125

abs	abs-A	abs-B	abs-C	abs-D	abs-E	n	neabs
83.14	0.31	0.04	0.0	0.0	0.0	7.75	8.76

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

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice	

Faculty: Faculty of Science	

Course ID: ÚINF/ SVK1/15	**Course name:** Student scientific conference

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: 6.

Course level: I., II.

Prerequisities:

Conditions for course completion:

Learning outcomes:

Brief outline of the course:

Recommended literature:

Course language:

Notes:

Course assessment
 Total number of assessed students: 182

A	B	C	D	E	FX
100.0	0.0	0.0	0.0	0.0	0.0

Provides:

Date of last modification: 03.05.2015

Approved:

COURSE INFORMATION LETTER

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

Course ID: ÚMV/ SVK/10	**Course name:** Students scientific conference

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: I., II.

Prerequisities:

Conditions for course completion:

Learning outcomes:
 Individual scientific work of students. Publishing of obtained results in a written form and as a public presentation.

Brief outline of the course:

Recommended literature:
 With respect to the research problematics (article in journals, books).

Course language:
 Slovak or English

Notes:

Course assessment
 Total number of assessed students: 101

A	B	C	D	E	FX
99.01	0.99	0.0	0.0	0.0	0.0

Provides:

Date of last modification: 03.05.2015

Approved:

COURSE INFORMATION LETTER

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

Course ID: ÚTVŠ/ LKSp/13	**Course name:** Summer Course-Rafting of TISA River

Course type, scope and the method:
 Course type: Practice
 Recommended course-load (hours):
 Per week: Per study period: 36s
 Course method: present

Number of ECTS credits: 2

Recommended semester/trimester of the course:

Course level: I., II.

Prerequisities:

Conditions for course completion:
 Conditions for course completion:
 Attendance
 Final assessment: Raft control on the waterway (attended/not attended)

Learning outcomes:
 Learning outcomes:
 Students have knowledge of rafts (canoe) and their control on waterway.

Brief outline of the course:
 Brief outline of the course:
 1. Assessment of difficulty of waterways
 2. Safety rules for rafting
 3. Setting up a crew
 4. Practical skills training using an empty canoe
 5. Canoe lifting and carrying
 6. Putting the canoe in the water without a shore contact
 7. Getting in the canoe
 8. Exiting the canoe
 9. Taking the canoe out of the water
 10. Steering
 a) The pry stroke (on fast waterways)
 b) The draw stroke
 11. Capsizing
 12. Commands

Recommended literature:

Course language:

Notes:

Course assessment	
Total number of assessed students: 153	
abs	n
45.75	54.25

Provides: Mgr. Dávid Kaško, PhD.

Date of last modification: 18.03.2019

Approved:

COURSE INFORMATION LETTER

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

Course ID: ÚTVŠ/ KP/12	**Course name:** Survival Course

Course type, scope and the method:
 Course type: Practice
 Recommended course-load (hours):
 Per week: Per study period: 36s
 Course method: combined, present

Number of ECTS credits: 2

Recommended semester/trimester of the course:

Course level: I., II.

Prerequisities:

Conditions for course completion:
 Conditions for course completion:
 Attendance
 Final assessment: continuous fulfilment of all tasks within the course

Learning outcomes:
 Learning outcomes:
 Students will be familiarized with principles of safe stay and movement in extreme natural conditions as they will obtain theoretical knowledge and practical skills to solve the extraordinary and demanding situations connected with survival and minimization of damage to health. The course develops team work and students will learn how to manage and face the situations that require overcoming of obstacles.

Brief outline of the course:
 Brief outline of the course:
 Lectures:
 1. Principles of behaviour and safety for movement and stay in unknown mountains
 2. Preparation and leadership of tour
 3. Objective and subjective danger in mountains
 4. Principles of hygiene and prevention of damage to health in extreme conditions
 Exercises:
 1. Movement in terrain, orientation and navigation in terrain (compasses, GPS)
 2. Preparation of improvised overnight stay
 3. Water treatment and food preparation.

Recommended literature:

Course language:

Notes:

Course assessment Total number of assessed students: 393	
abs	n
44.53	55.47

Provides: MUDr. Peter Dombrovský, Mgr. Ladislav Kručanica, PhD.

Date of last modification: 15.03.2019

Approved:

COURSE INFORMATION LETTER

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

Course ID: ÚINF/ TSD/19	**Course name:** Technologies of big data processing

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: 6.

Course level: I.

Prerequisities:

Conditions for course completion:

Learning outcomes:

Brief outline of the course:

Recommended literature:

Course language:

Notes:

Course assessment
 Total number of assessed students: 0

A	B	C	D	E	FX
0.0	0.0	0.0	0.0	0.0	0.0

Provides: RNDr. Peter Gurský, PhD.

Date of last modification: 09.07.2021

Approved:

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice	

Faculty: Faculty of Science	

Course ID: ÚINF/ TYS1/15	**Course name:** Typographical systems

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., 6.

Course level: I.

Prerequisities:

Conditions for course completion:

Learning outcomes:
To provide the basic information on principles for typesetting of documents containing mathematical formulas in Plain TeX, AMS-TeX, and LaTeX.

Brief outline of the course:
Typesetting of a plain text, special text symbols, using of text fonts. TeX macros. Enumerations in text and footnote command. Parameter setting determining the appearance of the pages. Typesetting of mathematical formulas in text and displays, aligning formulas. Definitions of TeX macros. Making tables and pictures. Definitions, theorems, and proofs in a mathematical document. Contents, bibliography, sections in a document.

Recommended literature:
1. D. E. Knuth, The TeXbook, Computers and Typesetting, Addison-Wesley, Reading, Massachusetts, 1986.
2. M. Doob, Jemný úvod do TeXu, CSTUG, 1990; èeský preklad z "A Gentle Introduction to TeX" (text vo¾ne prístupný v CTAN archíve).
3. O. Ulrych, AMS-TeX za 59 minút, (verzia 1.0), Praha, 1989.
4. J. Chlebíková, AMS-TeX (verzia 2.0), Bratislava, 1992.
5. M. Spivak, The Joy of TeX, Amer. Math. Soc., 1986.
6. L. Lamport, LaTeX: A Document Preparation System, Addison-Wesley, Massachusetts, 1986.
7. L. Lamport, MakeIndex: An index processor for LaTeX, 17 February 1987.
8. J. Rybièka, LaTeX pro začátečníky, Konvoj, Brno, 1995.
9. H. Partl, E. Schlegl, I. Hyna, P. Sýkora, LaTeX – Stručný popis.
10. T. Oetiker, H. Partl, I. Hyna, E. Schlegl, M. Kocer, P. Sýkora, Ne příliš stručný úvod do systému LaTeX2e (neboli LaTeX2e v 73 minutách).
11. M. Goossens, F. Mittelbach, and A. Samarin, The LaTeX Companion, Addison-Wesley, Reading, Massachusetts, 1994. Kapitola 8 je volne prístupná v TeX archívoch (ch8.pdf). 4
12. G. Grätzer, Math into LaTeX, 3rd edition, Birkhäuser, Boston, 2000.

Course language:
Slovak or english

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

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

Course ID: ÚINF/ POS2/15	**Course name:** User environments of operating systems

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: 1.

Course level: I.

Prerequisities:

Conditions for course completion:
 - written final theoretical exam (score at least 50%),
 - written final practical exam (score at least 50%)

Learning outcomes:
 To provide theoretical and practical background for studying computer science, by giving the necessary knowledge in the usage of Unix/Linux operating systems.

Brief outline of the course:
 (1) Introduction to Unix/Linux systems
 (2) Linux ommand line
 (3) Text processing tools
 (4) Managing files
 (5) Managing users, groups and rights
 (6) Managing processes
 (7) Managing software and packages
 (8) Administering the system - system booting, jobs, logging
 (9) Basic networking
 (10) Managing network interfaces
 (11) Managing disk partitions

Recommended literature:
 (1) LPIC-1 Linux Professional Institute Certification Study Guide Exam 101-400 and Exam 102-400 4th Edition
 (2) The Linux Documentation Project (https://www.tldp.org/)
 (3) The Linux Command Line, 2nd Edition: A Complete Introduction 2nd Edition

Course language:

Notes:

Course assessment					
Total number of assessed students: 113					
A	B	C	D	E	FX
46.02	8.85	22.12	7.96	12.39	2.65

Provides: RNDr. JUDr. Pavol Sokol, PhD., Mgr. Richard Staňa

Date of last modification: 14.01.2020

Approved:

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice	

Faculty: Faculty of Science	

Course ID: ÚFV/ VADA/19	**Course name:** Vybrané aplikácie dátovej analýzy

Course type, scope and the method:
  Course type: Lecture
  Recommended course-load (hours):
  Per week: 3 **Per study period:** 42
  Course method: present

Number of ECTS credits: 3

Recommended semester/trimester of the course: 6.

Course level: I.

Prerequisities:

Conditions for course completion:

Learning outcomes:

Brief outline of the course:

Recommended literature:

Course language:

Notes:

Course assessment
 Total number of assessed students: 0

A	B	C	D	E	FX
0.0	0.0	0.0	0.0	0.0	0.0

Provides: prof. RNDr. Milan Žukovič, PhD., doc. Mgr. Štefan Parimucha, PhD.

Date of last modification: 28.03.2019

Approved: