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COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice					
Faculty: Faculty of Science					
Course ID: KF/AFS/05		Course name: Ancient Philosophy and Present Times			
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: II.					
Prerequisites:					
Conditions for course completion: When implementing the subject in the classical - face-to-face - form of teaching: 40% - continuous assessment of student activity at seminars, partial seminar work - assignment. 60% - final test, or seminar paper in the range of 10 A4 standard pages (with compliance with the KF citation standard for seminar and qualification papers. In the case of a transition to distance education, students will be assigned sub-tasks for studying philosophical texts and processing the task in written form, which must be submitted by the set deadline, will be assigned points (partial assessment) and at the end will prepare a seminar paper to the same extent as in the face-to-face form teaching.					
Learning outcomes:					
Brief outline of the course: Point out the roots of Western civilization that go back to the Greeks. The ancient Greeks, as one of the 3 pillars of European culture, reveal the origins of democracy and critical thinking. Emphasizing the interconnectedness of ancient philosophy and EPISTEME will enable a better understanding of the issues of thought formation, the relationship between philosophy and science, and modern society, where the emergence of mathematical natural science in the 17th century is the pillar on which Europe and European humanity stand. The student will be able to understand the questions and problems of today if he discovers the foundations and contexts leading to serious questions of today's form of society, thinking, science and culture.					
Recommended literature:					
Course language:					
Notes:					
Course assessment Total number of assessed students: 31					
A	B	C	D	E	FX
80.65	6.45	6.45	0.0	6.45	0.0
Provides: doc. PhDr. Peter Nezník, CSc.					

Date of last modification: 24.08.2022
Approved: prof. RNDr. Katarína Cechlárová, DrSc.

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice					
Faculty: Faculty of Science					
Course ID: ÚMV/ ALA/10		Course name: Applied linear algebra			
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: 1., 3.					
Course level: II.					
Prerequisites:					
Conditions for course completion: According to tests and to the exam.					
Learning outcomes: To deepen and expand your knowledge of linear algebra, to get acquainted with selected calculation methodologies and to be able to apply them to specific problems and mathematical problems. Demonstrate knowledge of mathematical content in context. Completion of the course significantly completes the profile of the graduate.					
Brief outline of the course: Matrices over Euclidean rings, canonical forms. Polynomial matrices. Similar matrices. Jordan normal form. Functions of matrices, sequences, series. Inversion of singular matrices, pseudoinverse matrices and their application.					
Recommended literature: M. Fiedler: Speciální matice a jejich použití v numerické matematice, SNTL Praha, 1981. H.E.Rose: Linear Algebra, A Pure Mathematical Approach, Birkhäuser Verlag, 2002. D.Serre: Matrices, Theory and applications, Springer Verlag, 2002.					
Course language: Slovak					
Notes:					
Course assessment Total number of assessed students: 51					
A	B	C	D	E	FX
29.41	9.8	23.53	5.88	31.37	0.0
Provides: prof. RNDr. Danica Studenovská, CSc.					
Date of last modification: 19.04.2022					
Approved: prof. RNDr. Katarína Cechlárová, DrSc.					

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice	
Faculty: Faculty of Science	
Course ID: ÚMV/ APS/10	Course name: Applied statistics
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: 2.	
Course level: II.	
Prerequisites:	
Conditions for course completion: Given at the basis of statistical processing of real data. Final evaluation is given at the basis of partial examination, computing part, and oral part of the exam.	
Learning outcomes: Learning most frequently applied statistical methods.	
Brief outline of the course: <ul style="list-style-type: none"> o Matrices and linear spaces, g-inversions, projections o Normal distribution and related distributions o Hotelling's test o Probability foundations of regression and correlation o General linear model with full rank o Model with incomplete rank o Submodels testing o Regression analysis, basic models o Assessing the quality of a model o Analysis of variance o One-way ANOVA, multiple comparison procedures, problem of heteroskedasticity o Balanced factorial models, hierarchical models o Analysis of covariance o Statistical software for linear modeling 	
Recommended literature: <ul style="list-style-type: none"> • Rao: Linear statistical inference and its applications, Wiley, 1973 • Seber: Linear regression analysis, Wiley, 1977 • Searle: Linear models, Wiley, 1997 • Sen, Srivastava: Regression analysis (Theory, Methods, and Applications), Springer, 1990 • Christensen: Plane answers to complex questions (The Theory of Linear Models), Springer, 1987 	
Course language: Slovak	

Notes:					
Course assessment					
Total number of assessed students: 60					
A	B	C	D	E	FX
3.33	8.33	18.33	15.0	31.67	23.33
Provides: prof. RNDr. Ivan Žežula, CSc.					
Date of last modification: 14.04.2022					
Approved: prof. RNDr. Katarína Cechlárová, DrSc.					

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice					
Faculty: Faculty of Science					
Course ID: KF/KDF/05		Course name: Chapters from History of Philosophy of 19th and 20th Centuries (General Introduction)			
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: II.					
Prerequisites:					
Conditions for course completion:					
Learning outcomes:					
Brief outline of the course:					
Recommended literature:					
Course language:					
Notes:					
Course assessment Total number of assessed students: 10					
A	B	C	D	E	FX
50.0	20.0	10.0	0.0	10.0	10.0
Provides: PhDr. Dušan Hruška, PhD.					
Date of last modification: 03.05.2015					
Approved: prof. RNDr. Katarína Cechlárová, DrSc.					

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice	
Faculty: Faculty of Science	
Course ID: ÚMV/ KOA/10	Course name: Combinatorial algorithms
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: 6	
Recommended semester/trimester of the course: 2.	
Course level: II.	
Prerequisites:	
Conditions for course completion: The evaluation consists of a project (30 points) and an oral exam (70 points). The semester project consists of the elaboration of a computer program that returns the optimal solution or a acceptable approximation of the optimal solution, respectively, of a selected graph problem given by a suitable representation.	
Learning outcomes: Understanding of basic graph algorithm, the close connection between the theoretical and algorithmic aspects of discrete mathematics, ability to understand how selected algorithms can be derived from mathematical statements, ability to prove the correctness of algorithms.	
Brief outline of the course: Basic notions from graph theory. Introduction to algorithms and complexity. Basic types of algorithms - sorting algorithms, search algorithms, greedy algorithms. NP-completeness. Trees, spanning trees and rooted trees. Depth first search, breadth first search. Generating of all spanning trees of a graph, number of spanning trees. Minimum spanning tree problem (Kruskal, Prim, and Boruvka's algorithms). Distance in graphs. Shortest path problem in (non)oriented (weighted) graphs (various types of algorithms) and other variations of this problem. Introduction to network analysis, critical path method. Flows in networks, the max-flow min-cut theorem and related concepts. Matchings, maximum matchings in bipartite and general graphs, finding a matching with maximum weight in bipartite graphs. Location of centers in graphs, finding a center, absolute center, and a median of a graph. Eulerian graphs and Chinese postman's problem. Hamiltonian graphs, Travelling salesman problem and approximation algorithms for TSP.	
Recommended literature: 1. G. Chartrand, O.R. Oellermann: Applied and Algorithmic Graph Theory, McGraw-Hill, Inc. New York 1993. 2. J.L. Gross, J. Yellen: Graph Theory and Its Applications, Chapman & Hall/CRC 2006. 3. D. Jungnickel: Graphs, Networks, and Algorithms, Springer-Verlag Berlin 2005.	

4. J. Plesník: Grafové algoritmy, Veda Bratislava 1983.					
Course language: Slovak					
Notes:					
Course assessment Total number of assessed students: 99					
A	B	C	D	E	FX
35.35	26.26	22.22	9.09	5.05	2.02
Provides: RNDr. Mária Maceková, PhD.					
Date of last modification: 19.04.2022					
Approved: prof. RNDr. Katarína Cechlárová, DrSc.					

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice	
Faculty: Faculty of Science	
Course ID: ÚMV/ KDZ/10	Course name: Combinatorial designs
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: 1., 3.	
Course level: II.	
Prerequisites:	
Conditions for course completion: To complete the course, it is necessary to demonstrate the ability to formulate definitions and theorems from the lectured material, to present the proofs of theorems and to solve selected problems based on theory of combinatorial designs. The exam itakes written form by elaborating a test containing three questions of a theoretical nature and two questions of a practical / computational nature; the maximum number of points that can be obtained for answering each question is 20. To pass the exam, it is necessary to obtain more than half of the maximum number of 100 points (otherwise the exam is evaluated by FX), while the rating E is given in the case of point range 51-59, D in case of 60-69, C in case of 70-79, B in case of 80-89 and A in case of more than 90 points.	
Learning outcomes: After completing the course, the student is acquainted with the basics of the theory of combinatorial designs, its applications in the natural sciences and relations to other parts of mathematics.	
Brief outline of the course: Week 1: Motivational problems using combinatorial designs, definition and basic properties of BIBDs. Week 2: Incidence matrix of a design and its properties. Week 3: Constructions of BIBDs. Week 4: Symmetrical BIBDs, derived and residual design. Week 5: Order of symmetric BIBD, its relation to the number of points. Week 6: Finite projective planes. Week 7: Hadamard designs and Hadamard matrices. Week 8: Conditions for the existence of symmetric BIBDs, Lagrange's four-square theorem. Week 9: Bruck-Ryser-Chowla theorem and its consequences. Week 10 and 11: Steiner triple systems and their constructions. Week 12: Orthogonal Latin squares, orthogonal arrays. Week 13: Strongly regular graphs. Week 14: Selected applications of combinatorial designs (group testing of samples, sharing of secret information).	
Recommended literature:	

I. Anderson, I. Honkala: A short course in combinatorial designs, <http://www.utu.fi/~honkala/cover.html>
D.R. Stinson: Combinatorial Designs: Constructions and Analysis, Springer 2004
W.D. Wallis: Combinatorial designs, Marcel Dekker 1988

Course language:

Slovak or English

Notes:

Basic knowledge of arithmetic, linear algebra and graph theory is required, as well as basic knowledge of working with the Maple computer algebra system.

Course assessment

Total number of assessed students: 75

A	B	C	D	E	FX
30.67	20.0	24.0	20.0	5.33	0.0

Provides: prof. RNDr. Tomáš Madaras, PhD.

Date of last modification: 14.04.2022

Approved: prof. RNDr. Katarína Cechlárová, DrSc.

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice	
Faculty: Faculty of Science	
Course ID: KPPaPZ/KK/07	Course name: Communication and Cooperation
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: 3.	
Course level: II.	
Prerequisites:	
Conditions for course completion: Evaluation: A condition for student evaluation is his active participation in the seminar. It is expected that the student will actively participate in the discussions and will express their positions and possible solutions. The output for evaluation will be the development of a project in the form of a Power Point presentation or a video on a selected communication topic.	
Learning outcomes: The goal of the subject Communication, cooperation is the formation and development of students' language and communication skills through experiential activities. The student can demonstrate an understanding of individual behavior in various communication contexts. The student can describe, explain and evaluate communication techniques (cooperation, assertiveness, empathy, negotiation, persuasion) in practical contexts. The student can apply these techniques in common communication schemes.	
Brief outline of the course: Communication Communication theory Non-verbal communication and its means Verbal communication (basic components of communication, language means of communication) about active listening Empathy Short conversation and effective communication (principles and principles of effective communication) Cooperation About the basics of cooperation About types, signs, types and factors of cooperation Characteristics of the team (positions in the team) Small social group (structure, development, characteristics of a small social group, position of the individual in the group)	

About leadership (characteristics of the leader, management, leadership styles)		
Recommended literature:		
Course language:		
Notes:		
Course assessment		
Total number of assessed students: 281		
abs	n	z
98.22	1.78	0.0
Provides: Mgr. Ondrej Kalina, PhD., Mgr. Lucia Barbierik, PhD.		
Date of last modification: 31.07.2022		
Approved: prof. RNDr. Katarína Cechlárová, DrSc.		

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice	
Faculty: Faculty of Science	
Course ID: ÚMV/ VSM/10	Course name: Computational statistics and simulation methods
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: II.	
Prerequisites:	
Conditions for course completion: Written tests. Final evaluation is given at the basis of partial examination, written and oral part of exam.	
Learning outcomes: Getting to know modern software and computational and simulation methods in statistics.	
Brief outline of the course: <ul style="list-style-type: none"> o Types of statistical computations, popular mathematical software o Computing distribution and quantile functions o Matrix computations o Random numbers generation: <ul style="list-style-type: none"> a) Uniform distribution (linear reccurent generators, bit reccurent generators, nonlinear generators) b) General methods for other distributions c) Special methods for other distributions o Simulations o Approximate evaluation of an integral o Bootstrap method o Random processes and MCMC method o Introduction to Exploratory data analysis o Principles of cluster analysis o Principal component analysis o Factor analysis o GUHA method 	
Recommended literature: <ul style="list-style-type: none"> • Olehla, Věchet, Olehla: Řešení úloh matematické statistiky ve Fortranu, Nadas, 1982 • Olver et al.: NIST Handbook of mathematical functions, NIST and Cambridge University Press, 2010 • Deák: Random number generators and simulation, Akadémiai kiadó, 1990 • Fishman: Monte Carlo. Concepts, Algorithms, and Applications., Springer, 1996 • Backhaus, Erichson, Plinke, Weiber: Multivariate Analysemethoden, 7th ed., Springer, 1994 • Tan, Steinbach, Kumar: Introduction to Data Mining, Pearson Education Ltd., 2014 	

Course language: Slovak					
Notes:					
Course assessment Total number of assessed students: 54					
A	B	C	D	E	FX
16.67	20.37	24.07	9.26	25.93	3.7
Provides: prof. RNDr. Ivan Žežula, CSc., doc. RNDr. Daniel Klein, PhD.					
Date of last modification: 14.04.2022					
Approved: prof. RNDr. Katarína Cechlárová, DrSc.					

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice					
Faculty: Faculty of Science					
Course ID: ÚMV/ TSS/10		Course name: Control theory			
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: 6					
Recommended semester/trimester of the course: 1., 3.					
Course level: II.					
Prerequisites:					
Conditions for course completion: Based on two written tests during the semester and on the oral examination.					
Learning outcomes: To learn the basic notions of controllable systems.					
Brief outline of the course: Controllable systems. Pontrjagin maximum principle. Linear systems, bang-bang controls, singular controls.. Discrete systems, dynamic programming, Bellmann's optimality principle. Practical applications of theoretical results.					
Recommended literature: 1. K. Macki, A. Strauss: Introduction to Optimal Control Theory, Springer, 1980. 2. G. Feichtinger, R.F. Hartl: Optimale Kontrolle ökonomischer Prozesse, Berlin, 1986.					
Course language: Slovak					
Notes:					
Course assessment Total number of assessed students: 77					
A	B	C	D	E	FX
22.08	27.27	22.08	15.58	12.99	0.0
Provides: prof. RNDr. Katarína Cechlárová, DrSc.					
Date of last modification: 03.05.2015					
Approved: prof. RNDr. Katarína Cechlárová, DrSc.					

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.	
Prerequisites: ÚMV/UAD/10	
Conditions for course completion: Test (30p) and individual project work (20p). Oral presentation of the individual project work (5p). At least 50% must be obtained from each part. Final evaluation: $\geq 90\%$ A; $\geq 80\%$ B; $\geq 70\%$ C; $\geq 60\%$ D; $\geq 50\%$ E; $< 50\%$ FX.	
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. 6. Testing hypotheses about means. 7. Relationships between quantitative variables. Linear regression, multiple regression. 8. Data visualization using Python (part I). 9. Relationships between qualitative variables. Goodness-of-Fit tests and contingency tables. 10. Analysis of variance (principle, testing, graphical representation). 11. Data visualization using Python (part II). 12. Nonparametric methods of testing.	
Recommended literature: 1. Utts, J.M., Heckard, R.F. (2021), Mind od Statistics, 6th ed., Thomson Brooks/Cole 2. Peck, R., Short, T. (2019), Statistics: Learning from Data, 2nd ed., Cengage Learning 3. Crawley, M.J. (2005), Statistics: An Introducton using R, New York: Wiley 4. Wickham, H. (2016), ggplot2: Elegant Graphics for Data Analysis, 2nd ed. Springer 5. VanderPlas, J. (2017), Python Data Science Handbook, O'Reilly Media 6. Anděl J. (2011): Základy matematické statistiky, MatfyzPress, Praha (in Czech)	

Course language: Slovak					
Notes:					
Course assessment Total number of assessed students: 45					
A	B	C	D	E	FX
73.33	13.33	11.11	2.22	0.0	0.0
Provides: doc. RNDr. Martina Hančová, PhD., RNDr. Andrej Gajdoš, PhD.					
Date of last modification: 14.04.2022					
Approved: prof. RNDr. Katarína Cechlárová, DrSc.					

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: 3.	
Course level: I., II.	
Prerequisites:	
Conditions for course completion: Demonstration of adequate mastery of the content standard of the subject in the ongoing and final evaluation, the ability to formulate a problem in the acquired terminology and solve it within a project. Written works during the semester, project. Written and oral exam.	
Learning outcomes: After completing the course, the student acquires the principles of relational databases, is able to apply standard data models, design relational databases and formulate filtering queries.	
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:
Slovak or English

Notes:

Course assessment

Total number of assessed students: 725

A	B	C	D	E	FX
12.83	9.66	13.66	20.41	33.24	10.21

Provides: doc. RNDr. Csaba Török, CSc.

Date of last modification: 08.01.2022

Approved: prof. RNDr. Katarína Cechlárová, DrSc.

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice	
Faculty: Faculty of Science	
Course ID: ÚMV/ DPP1a/14	Course name: Diploma project I
Course type, scope and the method: Course type: Recommended course-load (hours): Per week: Per study period: Course method: present	
Number of ECTS credits: 1	
Recommended semester/trimester of the course: 2.	
Course level: II.	
Prerequisites:	
Conditions for course completion:	
Learning outcomes:	
Brief outline of the course:	
Recommended literature:	
Course language: Slovak	
Notes:	
Course assessment Total number of assessed students: 120	
abs	n
99.17	0.83
Provides:	
Date of last modification: 03.05.2015	
Approved: prof. RNDr. Katarína Cechlárová, DrSc.	

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice	
Faculty: Faculty of Science	
Course ID: ÚMV/ DPP1b/14	Course name: Diploma project II
Course type, scope and the method: Course type: Recommended course-load (hours): Per week: Per study period: Course method: present	
Number of ECTS credits: 1	
Recommended semester/trimester of the course: 3.	
Course level: II.	
Prerequisites: ÚMV/DPP1a/14	
Conditions for course completion:	
Learning outcomes:	
Brief outline of the course:	
Recommended literature:	
Course language: Slovak	
Notes:	
Course assessment Total number of assessed students: 42	
abs	n
100.0	0.0
Provides:	
Date of last modification: 03.05.2015	
Approved: prof. RNDr. Katarína Cechlárová, DrSc.	

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice					
Faculty: Faculty of Science					
Course ID: ÚMV/ DPO/14		Course name: Diploma 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: 20					
Recommended semester/trimester of the course:					
Course level: II.					
Prerequisites:					
Conditions for course completion:					
Learning outcomes:					
Brief outline of the course:					
Recommended literature:					
Course language: Slovak					
Notes:					
Course assessment Total number of assessed students: 48					
A	B	C	D	E	FX
58.33	20.83	12.5	4.17	2.08	2.08
Provides:					
Date of last modification: 07.12.2021					
Approved: prof. RNDr. Katarína Cechlárová, DrSc.					

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice					
Faculty: Faculty of Science					
Course ID: ÚMV/ FAN/10		Course name: Functional 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: 6					
Recommended semester/trimester of the course: 2.					
Course level: II.					
Prerequisites:					
Conditions for course completion: exam					
Learning outcomes: Understanding of the basic rigorous ideas of Applied Functional Analysis.					
Brief outline of the course: Linear spaces. Algebraic base and dimension. Linear operators and functionals. Algebraic dual spaces. Linear topological space. Locally convex space. Normed space. $L(p)$ spaces. Dual spaces of $L(p)$ spaces. Hilbert space. Applications of Baire category theorem. Open mapping theorem. Closed graph theorem. Hahn-Banach theorem. Spectrum of linear compact operator.					
Recommended literature: A. M. Bruckner, J. B. Bruckner, B. S. Thomson: Real Analysis, Prentice Hall, 1997. B. P. Rynne, M. A. Youngson: Linear Functional Analysis, Springer-Verlag, 2008.					
Course language: Slovak or English					
Notes:					
Course assessment Total number of assessed students: 70					
A	B	C	D	E	FX
5.71	8.57	8.57	20.0	45.71	11.43
Provides: prof. RNDr. Jozef Doboš, CSc.					
Date of last modification: 02.02.2022					
Approved: prof. RNDr. Katarína Cechlárová, DrSc.					

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice					
Faculty: Faculty of Science					
Course ID: ÚMV/ THR/10		Course name: Game theory			
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: 6					
Recommended semester/trimester of the course: 1., 3.					
Course level: II.					
Prerequisites:					
Conditions for course completion: Two written exams during the semester (solving problems), presentation of an interesting model. The final assessment is based on the written tests and oral examination.					
Learning outcomes: Knowledge of basic models of noncooperative and cooperative game theory, solution methods and applications of game-theoretic models in economics and everyday life.					
Brief outline of the course: Examples of games. Extensive form of a game, value of the game. Von Neumann Morgenstern theory of utility. Matrix games and their solution. Bimatrix games. Negotiations theory. n-person games: core, Shapley value. Economic applications of game theory. The students should have basic knowledge in probability theory and linear programming (including duality theory and simplex method).					
Recommended literature: 1. K. Binmore, Fun and games, D.C. Heath, 1992 2. G. Owen, Game Theory, Academic Press (existuje ruský preklad). 3. A.R. Karlin, Y. Peres, Game theory alive, American Mathematical Society, 2017 4. L.C. Thomas, Games, Theory and Applications, Wiley, New York. 5. H.S. Bierman, L. Fernandez, Game Theory with Economic Applications, Addison-Wesley, 1998.					
Course language: Slovak					
Notes:					
Course assessment Total number of assessed students: 87					
A	B	C	D	E	FX
19.54	20.69	24.14	18.39	14.94	2.3
Provides: prof. RNDr. Katarína Cechlárová, DrSc.					

Date of last modification: 19.09.2021
Approved: prof. RNDr. Katarína Cechlárová, DrSc.

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:	
Course level: I., II.	
Prerequisites:	
Conditions for course completion: The condition for awarding the evaluation will be the active approach of students to fulfilling their study obligations, independent work with selected philosophical texts in the library, active participation and creative work in seminars. In connection with the possibility of interrupting face-to-face teaching, there will be greater demands on the student's independent study and the processing of professional literature, which will be continuously evaluated, using e-mail to communicate with the teacher, at the end of the semester, preparing and handing in the semester's seminar work by the set date, or also passing a knowledge test - about which the students will be informed in advance in sufficient time.	
Learning outcomes: Deepening knowledge about the development of spiritual culture in the European spiritual space and pointing out the most important sources of this development: (1) ancient philosophy and science, (2) Christianity as the second pillar of Europe, (3) the Renaissance and the emergence of modern science (mathematical natural science) as the third pillar of European development. Development of critical thinking skills, active position in professional (ethics of science), public and private life (ethics of responsibility). Transcending narrowly specialized views of the world.	
Brief outline of the course:	
Recommended literature: Antológia z diel filozofov. Predsokratovci a Platon. Zost. J. Martinka. Bratislava: Nakladateľstvo Epocha 1970; Antológia z diel filozofov. Od Aristotela po Plotina. Zost. J. Martinka. Bratislava: Nakladateľstvo Pravda 1972. Predsokratovci a Platon. Antológia z diel filozofov. Zost. J. Martinka. Bratislava: Vydavateľstvo Iris 1998. Od Aristotela po Plotina. Antológia z diel filozofov. Zost. J. Martinka. Bratislava: Vydavateľstvo IRIS 2006. Anzenbacher, A.: Úvod do filozofie. Prel. K. Šprunk. Praha: SPN 1990. Barthes, R.: Mytologie. Prel. J. Fulka. Praha: Dokořán 2004. Bělohradský, V.: Společnost nevolnosti. Eseje z pozdější doby. Praha: SLON 2009. Benjamin, W.: Iluminácie. Prel. A. Bžoch; J. Truhlářová. Bratislava: Kalligram 1999. Borges, J. L.: Borges ústne. Prednášky a eseje. Prel. P. Šišmišová. Bratislava: Kalligram 2005. Cassirer, E.: Esej o človeku. Prel. J. Piaček. Bratislava: Nakladateľstvo Pravda 1977. Debord, G.: Společnost spektaklu. Prel. J. Fulka; P. Siostrzonek. Praha: Nakladatelství :intu: 2007. Farkašová, E.: Na rube plátna. Bratislava: Vydavateľstvo Spolku slovenských spisovateľov 2013.	

Feyerabend, P.: Věda jako umění. Prel. P. Kurka. Praha: JEŽEK 2004. Freud, S.: Nepokojenost v kultuře. Prel. L. Hošek. Praha: Hynek 1998. Hadot, P.: Co je antická filosofie. Prel. M. Křížová. Praha: Vyšehrad 2017. Hippokratés: Vybrané spisy. Prel. H. Bartoš; J. Černá; J. Daneš; S. Fischerová. Praha: OIKOYMENH 2012. Husserl, E.: Filosofie jako přísná věda. Prel. A. Novák. Praha: Togga 2013. Kuhn, T. S.: Štruktúra vedeckých revolúcií. Prel. J. Viceník. Bratislava: Nakladateľstvo Pravda 1981. Leško, V., Mihina, F. a kol.: Dejiny filozofie. Bratislava. Iris 1993. Leško, V.: Dejiny filozofie I. Od Tálesa po Galileiho. Prešov: v. n. 2004, 2007. Leško, V.: Dejiny filozofie II. Od Bacona po Nietzscheho. Prešov: v. n. 2008. McLuhan, M.: Jak rozumět médiím. Extenze člověka. Prel. M. Calda. Praha: Mladá fronta 2011. Patočka, J.: Duchovní člověk a intelektuál. In: Patočka, J.: Péče o duši III. Praha: OIKOYMENH 2002, s. 355 - 371. Popper, K. R.: Otevřená společnost a její nepřátelé I. Platónovo zařikávání. Prel. M. Calda; J. Moulal. Praha: OIKOYMENH 2011. Sloterdijk, P.: Kritika cynického rozumu. Prel. M. Szabó. Bratislava: Kalligram 2013. Störig, H. J.: Malé dějiny filozofie. Prel. P. Rezek. Praha: Zvon 1991. Wittgenstein, L.: Filozofické skúmania. Prel. F. Novosád. Bratislava: Nakladateľstvo Pravda 1979. Wright von, H. G.: Humanizmus ako životný postoj. Prel. M. Žitný. Kalligram 2001. Žižek, S.: Mor fantázií. Prel. M. Gálisová; V. Gális. Bratislava: Kalligram 1998.

Course language:

Notes:

Course assessment

Total number of assessed students: 746

A	B	C	D	E	FX
60.59	14.21	12.6	8.58	3.35	0.67

Provides: doc. PhDr. Peter Nezník, CSc.

Date of last modification: 11.07.2022

Approved: prof. RNDr. Katarína Cechlárová, DrSc.

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice	
Faculty: Faculty of Science	
Course ID: KF/IH2/03	Course name: Idea Humanitas 2 (General Introduction)
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: 3.	
Course level: II.	
Prerequisites:	
Conditions for course completion: 100% graded credit: 40% (evaluated participation in seminars, processing of partial seminar work - separate assignment) 60% (final seminar work - student project). In the case of implementation of the classical form of teaching - face-to-face - active participation of the student in the seminar; study and reflection of assigned philosophical texts, attempt to interpret them. In the case of the introduction of distance education (as was the case due to Covid-19), the student will have to actively fulfill tasks of a partial nature, where increased demands will be placed on the student and his independent work with philosophical texts and literature. Tasks will be assigned to the students by the teacher on an ongoing basis. The student must study the assigned philosophical texts, think through and process them, submit them as a seminar paper, i.e. in written form. In both cases, the study of literature is necessary to pass the subject. The conclusion of the subject is the preparation of a seminar paper - the final seminar paper - in the range of at least 10 - 12 pages of A4 (with compliance with the bibliographic standard of the Department of Philosophy (KF) for seminar and qualification papers).	
Learning outcomes: To supplement and expand the interest of natural science students in social science issues related to the issues of the development of philosophy, science and human leadership, which are manifested in the urgent problems of today's world and society. Special emphasis is placed on the formation of humanistic ideas, their origin, transformation and possible pitfalls and risks. In addition to thinking about serious questions of the past and present, it also includes thinking about the present and the current contexts of major topics in philosophy and Western culture in particular. Therefore, the preparation and implementation of a program aimed at cooperation with alternative directions of pedagogy in the conditions of our transforming education system is understood as a practical output.	
Brief outline of the course: The age of the image of the world. Doubt as a principle of philosophy. The emergence of the image of the world (Weltbild); the differences of ancient theoria, medieval scientia, the emergence of mathematical natural science. Science as an operation (Betrieb); institutionalization of science. Philosophy, science and the modern world. The movement of human life: acceptance, defense, freedom as struggle, submission to finitude. The modern world and the search for meaning. Bureaucracy, impersonality, predominance of technocratic approaches. Fatigue as a modern threat	

to Europe. The paths to freedom lead through the rediscovery of one's own Self and creativity. The basic condition for the educability of any education is the care of the soul. The crisis of European humanity. Antiquity. Philosophy - the emergence of a special community of people, the beginnings of education - paideia. The winding road of leadership. The origin and birthplace of calculating thinking. Europe and the post-European era. Care of the soul as a basic idea of Patočka's philosophy. The difference in the position of Plato and Democritus in understanding the care of the soul. The idea of caring for the soul and Aristotle.

Recommended literature:

Hadot, P.: What is ancient philosophy. Transl. M. Křížová. Prague: Vyšehrad 2017. Hegel, G. W. F.: Phenomenology of Spirit. Prague: NČSAV 1960 Husserl, E.: The Crisis of European Humanity and Philosophy. In: Crisis of European sciences and transcendental phenomenology. Prague: Akademie 1996. Mokrejš, A.: Eros as a Theme of Greek Thought. Prague: Triton 2009. Patočka, J.: Péče o duši I. Prague. OIKOYMENH 1996. Patočka, J.: Care of the soul II. Prague. OIKOYMENH 1999. Vernant, J.-P.: The beginnings of Greek thought. Prague: OIKOYMENH 1995. Wright von, G.H.: Humanism as a life attitude. Bratislava: Kalligram 2001.

Course language:

Notes:

Course assessment

Total number of assessed students: 12

A	B	C	D	E	FX
91.67	8.33	0.0	0.0	0.0	0.0

Provides: doc. PhDr. Peter Nezník, CSc.

Date of last modification: 24.08.2022

Approved: prof. RNDr. Katarína Cechlárová, DrSc.

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice					
Faculty: Faculty of Science					
Course ID: ÚMV/ TIN/10		Course name: Information theory			
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: 1., 3.					
Course level: II.					
Prerequisites:					
Conditions for course completion: A student is evaluated according to an oral examination during which he/she answers two questions chosen by him/her at random, one from the group A and one from the group B (both for 50 points at maximum). Evaluation scale: A ... 90-100 p., B ... 80-89 p., C ... 70-79 p., D ... 60-69 p., E ... 50-59 p., FX ... 0-49 p.					
Learning outcomes: A student gets acquainted with a mathematical attempt to solve some problems of computer science.					
Brief outline of the course: A quantitative characteristic of an information (2 weeks). Entropy of a random variable (3 weeks). Mutual information (2 weeks). Inequalities involving mutual information and those involving entropy (3 weeks). Typical sequence, typical set (3 weeks).					
Recommended literature: T. M. Cover, J. A. Thomas, Elements of Information Theory, Wiley, 1991 (2nd ed. 2006) T. K. Moon, Information Theory (free online course materials), available at the address http://digitalcommons.usu.edu/ocw_ece/3/					
Course language: Slovak					
Notes:					
Course assessment Total number of assessed students: 41					
A	B	C	D	E	FX
58.54	4.88	12.2	4.88	19.51	0.0
Provides: prof. RNDr. Mirko Horňák, CSc.					
Date of last modification: 31.01.2022					
Approved: prof. RNDr. Katarína Cechlárová, DrSc.					

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice	
Faculty: Faculty of Science	
Course ID: ÚMV/ MPA/19	Course name: Markov's processes and their applications
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: II.	
Prerequisites:	
Conditions for course completion: Total evaluation based on 2 written tests (2x40p) + assignment (5p) and oral exam (40p). At least 50% must be obtained from each part. Final evaluation: $\geq 90\%$ A; $\geq 80\%$ B; $\geq 70\%$ C; $\geq 60\%$ D; $\geq 50\%$ E; $< 50\%$ FX.	
Learning outcomes: Student should: <ol style="list-style-type: none"> 1. Obtain the knowledge about modelling of real stochastic processes. 2. Apply theoretical knowledge in practical problems solving in queuing and renewal theory. 3. Obtain basic skills with CAS software SageMath based on Python. 	
Brief outline of the course: <ol style="list-style-type: none"> 1. Stochastic (random) processes (definition, characteristics, classification of processes). 2. Markov chains (Markov property, transition matrix, discrete-time Markov chains). 3. Classification of states of the process. 4. Evaluation of transitions, optimal strategies, Howard's algorithm. 5. Special chains with continuous time (continuous-time Markov chains, intensity of transition, Kolmogorov's differential equations, Poisson process). 6. Birth-and-death processes. 7. Applications in queuing theory (Kendall's classification of queuing systems, efficiency indicators, opened systems without waiting). 8.-9. Opened systems with waiting, closed systems. 10. Applications in renewal theory and reliability. Markov chains in discrete renewal models. 11. Renewal process with continuous time. 12. Reliability of the system of elements. 13. Limit theorems of renewal theory. 	
Recommended literature: <ol style="list-style-type: none"> 1. Skřivánková V., Hančová M.: Náhodné procesy a ich aplikácie, UPJŠ, Košice, 2018 (in Slovak) 2. Beichelt F.: Applied Probability and Stochastic Processes, 2nd Ed., Chapman and Hall, 2016 3. Ross S. M.: Introduction to Probability Models, 12th ed., Elsevier, 2019 4. Janková, K. a kol. Markovove reťazce a ich aplikácie, epos, 2014 (in Slovak) 	

5. Prášková Z., Lachout P.: Základy náhodných procesu, MFF UK, Praha, 1998 (in Czech)					
Course language: Slovak					
Notes: The students are required to have basic knowledge about axiomatical theory of probability, distributions and characteristics of random variables.					
Course assessment Total number of assessed students: 80					
A	B	C	D	E	FX
25.0	15.0	21.25	20.0	16.25	2.5
Provides: doc. RNDr. Martina Hančová, PhD., RNDr. Andrej Gajdoš, PhD.					
Date of last modification: 13.09.2021					
Approved: prof. RNDr. Katarína Cechlárová, DrSc.					

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice					
Faculty: Faculty of Science					
Course ID: ÚMV/ MTE/18		Course name: Mathematical economics			
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: 2., 4.					
Course level: II.					
Prerequisites:					
Conditions for course completion: Two written exams in solving problems. Final evaluation is based on written exams and theoretical oral exam.					
Learning outcomes: To learn basic notions and methods of the modern mathematical economics.					
Brief outline of the course: The notion of exchange economy. Edgeworth box. Preferences and utility functions. Optimality in exchange economies. Existence of core. Walrasian equilibrium. Optimality and decentralization. Production economies. Basic knowledge of convex analysis and topology is recommended. Basic knowledge in microeconomics is also invited.					
Recommended literature: 1. C.D. Aliprantis, D.J. Brown, O. Burkinshaw: Existence and optimality of competitive equilibria, Springer 1989 2. W. Hildenbrand, A.P. Kirman: Equilibrium analysis, North Holland, 3. A. Takayama: Mathematical economics, Cambridge University Press, 1985					
Course language: Slovak					
Notes:					
Course assessment Total number of assessed students: 83					
A	B	C	D	E	FX
24.1	20.48	19.28	21.69	9.64	4.82
Provides: prof. RNDr. Katarína Cechlárová, DrSc.					
Date of last modification: 07.03.2018					
Approved: prof. RNDr. Katarína Cechlárová, DrSc.					

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice	
Faculty: Faculty of Science	
Course ID: ÚMV/MSE/14	Course name: Mathematical methods in economics, finance and insurance
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: II.	
Prerequisites:	
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/MPA/19, ÚMV/NPR/19, ÚMV/APS/10, ÚMV/MMF/10, ÚMV/THR/10, ÚMV/MTE/10. <ol style="list-style-type: none"> 1. Probability distributions of random vectors and their characteristics. 2. Types of convergence of random variables and limit theorems. 3. Markov chains and processes. 4. Modelling queueing systems. 5. Measuring dependence of random variables and regression models. 6. Analysis of variance and covariance. 7. Time series analysis. 8. Portfolio theory, characteristics of portfolio and modelling financial markets. 9. Exchange economy with infinitely divisible goods, core and equilibrium. 10. Exchange economy with indivisible goods, algorithms. 11. Games of two players. 12. Cooperative games of n players. 	
Recommended literature:	
Course language: Slovak	
Notes:	

Course assessment					
Total number of assessed students: 25					
A	B	C	D	E	FX
28.0	28.0	24.0	16.0	4.0	0.0
Provides:					
Date of last modification: 07.04.2020					
Approved: prof. RNDr. Katarína Cechlárová, DrSc.					

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice	
Faculty: Faculty of Science	
Course ID: ÚMV/ MMF/10	Course name: Mathematical methods in finance
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: 2.	
Course level: II.	
Prerequisites:	
Conditions for course completion: Written tests during the semester. Final evaluation is based on written tests and oral exam.	
Learning outcomes: To provide stochastic methods for investments, financial market analysis and financial forecasting.	
Brief outline of the course: Financial markets, institutions and instruments. Stochastic methods of valuation of financial products. Risk and return, analysis of portfolio of securities. Characteristics of portfolio, mean and variance, measures of dependencies. Admissible, efficient and optimal portfolio. Indifference curves, utility functions. Financial market models. Markowitz's mean-variance model and its modifications, model of capital market line (CML). Sharpe's model and its modifications. Capital assets pricing model (CAPM), security market line model (SML). Decomposition of total risk, market risk and specific risk. Diversification of portfolio. Measurement of performance. Investment and financial decisions. Financial derivatives, their classification and pricing. Financial time series and their decomposition. Analytical and adaptive methods of smoothing. Financial forecasting. Hypothesis of randomness.	
Recommended literature: 1. Skřivánková V.-Skřivánek J.: Kvantitativne metódy finančných operácií, IURA Edition, Bratislava, 2006. 2. Elliott R.J.-Kopp P.E.: Mathematics of Financial Markets, Springer, New York, 2005. 3. Janssen et al.: Mathematical Finance, ISTE / Wiley, 2009. 4. Ross S.M.: Mathematical Finance, Cambridge University Press, 2011. 5. Sharpe W.F.- Alexander G.J.: Investments, Prentice-Hall, New Jersey, 1994. 6. Shreve S.E.: Stochastic Calculus for Finance, Springer, 2004.	
Course language: Slovak	
Notes:	

Course assessment					
Total number of assessed students: 54					
A	B	C	D	E	FX
12.96	24.07	14.81	31.48	16.67	0.0
Provides: prof. RNDr. Katarína Cechlárová, DrSc., RNDr. Barbora Klemová, RNDr. Diana Trellová					
Date of last modification: 21.03.2022					
Approved: prof. RNDr. Katarína Cechlárová, DrSc.					

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice	
Faculty: Faculty of Science	
Course ID: ÚMV/ MTV/20	Course name: Mathematical theory of voting and elections
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: 2., 4.	
Course level: II.	
Prerequisites:	
Conditions for course completion: Final evaluation is given by continuous assessment, project and oral exam.	
Learning outcomes: ???	
Brief outline of the course: <ol style="list-style-type: none"> 1. Historical examples, examples of paradoxes: Condorcet, Borda. Basic formal definitions. 2. Elections with two candidates. May's theorem. 3. Voting systems: plurality, approval, Borda, scoring systems. Properties of scoring systems. Saari's theorems and Fishburn's theorem. 4. Other properties of voting systems: monotonicity, Parato optimality, independence. Impossibility theorems. 5. Condorcet, Copeland, Llul, Copelandov-alfa, Dodgso systems. Computational complexity of winner determination. 6. Election manipulation. Gibbard-Sattertwaite theorem. 7. Complexity of manipulation. 8. Other models: incomplete information, possible and necessary winner. 9. Proportional representation. Paradoxes. Divisor and quota methods. Balinski-Young theorem. 10. Extension of proportional representation: combining proportionality with personal elections, voting districts. 11. Electoral college 12. Students' presentations. 	
Recommended literature: <ol style="list-style-type: none"> 1. E. A. Robinson, D. H. Ullmann: A mathematical look at politics, CRC Press, 2010 2. J. Rothe (ed.): Economics and Computation, Springer, 2016 3. F. Brandt, V. Conitzer, U. Endriss, J. Lang, A.D. Procaccia: Handbook of computational social choice, Cambridge University Press, 2016 4. F. Pukelsheim, Proportional Representation, Springer, 2013 5. Donald G. Saari, Geometry of Voting, 1994 6. Sherif El-Helaly: The Mathematics of Voting and Apportionment, Birkhäuser, 2019 7. G. G. Szpiro, Numbers rule, Princeton University Press, 2010 	

Course language: Slovak					
Notes:					
Course assessment Total number of assessed students: 3					
A	B	C	D	E	FX
33.33	66.67	0.0	0.0	0.0	0.0
Provides: prof. RNDr. Katarína Cechlárová, DrSc.					
Date of last modification: 19.04.2022					
Approved: prof. RNDr. Katarína Cechlárová, DrSc.					

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice					
Faculty: Faculty of Science					
Course ID: ÚMV/TMT/10		Course name: Matroid theory			
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: 5					
Recommended semester/trimester of the course: 1., 3.					
Course level: II.					
Prerequisites:					
Conditions for course completion: A student is evaluated according to an oral examination during which he/she answers two questions chosen by him/her at random, one from the group A (65 points at maximum) and one from the group B (35 points at maximum). Evaluation scale: A ... 90-100 p., B ... 80-89 p., C ... 70-79 p., D ... 60-69 p., E ... 50-59 p., FX ... 0-49 p.					
Learning outcomes: A student gets acquainted with basic notions of matroid theory and possibilities of using matroids in various disciplines of discrete mathematics.					
Brief outline of the course: Independent sets and bases (3 weeks). Properties of rank function (2 weeks). Closure operator (3 weeks). Circuits (3 weeks). Duality in matroids (2 weeks).					
Recommended literature: D. J. A. Welsh: Matroid Theory, Academic Press, 1976 J. Oxley, Matroid Theory, Oxford University Press, 2010					
Course language: Slovak					
Notes:					
Course assessment Total number of assessed students: 21					
A	B	C	D	E	FX
19.05	14.29	28.57	14.29	9.52	14.29
Provides: prof. RNDr. Mirko Horňák, CSc.					
Date of last modification: 31.01.2022					
Approved: prof. RNDr. Katarína Cechlárová, DrSc.					

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice	
Faculty: Faculty of Science	
Course ID: ÚBEV/ MOB2/10	Course name: Molecular Biology
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: 2.	
Course level: I., II.	
Prerequisites:	
Conditions for course completion:	
Learning outcomes: Familiarize students with the structure, properties and functions of information macromolecules and their work, focusing primarily on the molecular mechanisms of regulation of DNA replication, gene expression and cell cycle.	
Brief outline of the course: <ol style="list-style-type: none"> 1. Structure and properties of information biomacromolecules. 2. Chromatine molecular structure and dynamics and organization of chromosome. 3. Replication of chromosomal and extrachromosomal DNAs. 4. Mutations and DNA repair. 5. Prokaryotic and eukaryotic genome. Human genome. 6. Mobile gene elements. 7. Transcription and postranscription processing of RNA. 8. Translation and posttranslational modification of proteins. Protein degradation. 9. Interaction of proteins with DNA. Regulation of gene expression in prokaryotes. 10. Regulation of gene expression in eukaryotes. 11. Cell signaling. 12. Cell cycle and cell cycle control. 	
Recommended literature: E. Mišúrová: Molekulárna biológia. Učebné texty, PF UPJŠ Košice, 1999 E. Mišúrová, P. Solár: Molekulová biológia. Učebné texty, PF UPJŠ, 2007 S. Rosypal: Úvod do molekulární biologie. Grafex Blansko, Brno, 1999 D.P. Clark: Molecular Biology, Elsevier Academic Press, London, 2005 D.P. Clark, N. Pazdernik, M. McGehee: Molecular Biology, 3rd Edition, Elsevier 2018	
Course language:	
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. Peter Pristaš, CSc.					
Date of last modification: 19.12.2021					
Approved: prof. RNDr. Katarína Cechlárová, DrSc.					

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice	
Faculty: Faculty of Science	
Course ID: KPPaPZ/PPZMg/12	Course name: Psychology and Health Psychology (Master's Study)
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:	
Course level: II.	
Prerequisites:	
Conditions for course completion: Conditions for the continuous assessment during the semester: Active work (maximum 5 points, 2 absences are allowed). Preparation, presentation and discussion on a selected topic - max. 15 points. Written examination (maximum 30 points). Conditions for admission to the exam: min. 25 points. Conditions for the final assessment: Exam: written form (max. 50 points, min. 25 points) Conditions for successful completion of the course: participation in lessons, fulfillment of assignments and at least 66 points from the overall evaluation. Detailed information in the electronic bulletin board of the course in AIS2. The teaching of the subject will be realized by a combined method.	
Learning outcomes: The student will understand the basic concepts and theories of health psychology, can explain salutogenic factors as well as the consequences of risk behavior related to health. He is able to apply the knowledge especially in the field of prevention of burnout syndrome and support of mental health in the work of a teacher.	
Brief outline of the course: 1 Introduction to health psychology 2 Psychoimmunology 3 Personality factors and health 4 Social support as a protective factor in relation to health 5 Subjective well-being 6 Stress and stressful situations and ways to manage them 7 Burnout syndrome 8 Health-promoting behavior, mental hygiene 9 Health risk behavior 10 School as an important factor of health	
Recommended literature: Křivohlavý, J.: Psychologie zdraví. Portál, Praha 2001.	

Křivohlavý, J.: Psychologie nemoci. Grada, Praha, 2002.
 Křivohlavý, J.: Psychologie moudrosti a dobrého života. Grada, Praha, 2009.
 Kebza, V.: Psychosociální determinanty zdraví. Academia, Praha 2005.
 Kahneman, D., Diener, E., Schwarz, N.(Eds), Well-Being. The Foundations of Hedonic Psychology. New York, Russell Sage Foundation, 2003.
 Kaplan, R. M.: Zdravie a správanie človeka. SPN, Bratislava 1996.
 Sarafino, E. P.: Health Psychology. Biopsychosocial interactions. John Wiley and sons 1994.
 Baštecký, J., Šavlík, J., Šimek, J. 1993. Psychosomatická medicína. Praha: Grada
 Tress, W., Krusse, J., Ott, J.: Základní psychosomatická péče. Portál, Praha 2008.

Course language:

slovak

Notes:

Course assessment

Total number of assessed students: 226

A	B	C	D	E	FX
19.47	25.22	25.66	13.27	15.93	0.44

Provides: PhDr. Anna Janovská, PhD., Mgr. Lucia Barbierik, PhD.

Date of last modification: 07.07.2021

Approved: prof. RNDr. Katarína Cechlárová, DrSc.

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice					
Faculty: Faculty of Science					
Course ID: ÚMV/ THO/10		Course name: Queueing theory			
Course type, scope and the method: Course type: Lecture Recommended course-load (hours): Per week: 4 Per study period: 56 Course method: present					
Number of ECTS credits: 6					
Recommended semester/trimester of the course: 1., 3.					
Course level: II.					
Prerequisites:					
Conditions for course completion: A student is evaluated according to an oral examination during which he/she answers two questions chosen by him/her at random, one from the group A and one from the group B, both 50 points at maximum. Evaluation scale: A ... 90-100 p., B ... 80-89 p., C ... 70-79 p., D ... 60-69 p., E ... 50-59 p., FX ... 0-49 p.					
Learning outcomes: A student gets acquainted with analysis of input requests streams and with functioning of simple queueing systems.					
Brief outline of the course: Queueing system (1 week). Basic properties of input requests streams into a queueing system (1 week). The simplest input requests stream (2 weeks). Ordinary memoryless input requests stream (2 weeks). Auxiliary lemmas (1 week). Stationary memoryless input requests stream (1 week). Finite memoryless input requests stream (3 weeks). Analysis of a simple queueing system (2 weeks).					
Recommended literature: B.V. Gnedenko and I.N. Kovalenko, Introduction to Queueing Theory, Second Edition, Birkhäuser Boston, Cambridge MA, 1989					
Course language: Slovak					
Notes:					
Course assessment Total number of assessed students: 31					
A	B	C	D	E	FX
29.03	22.58	9.68	16.13	16.13	6.45
Provides: prof. RNDr. Mirko Horňák, CSc.					
Date of last modification: 13.09.2021					
Approved: prof. RNDr. Katarína Cechlárová, DrSc.					

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice	
Faculty: Faculty of Science	
Course ID: ÚMV/ TRZ/15	Course name: Risk theory
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: 2., 4.	
Course level: II.	
Prerequisites:	
Conditions for course completion: Based on written tests and oral exam. Project elaborated in statistical software.	
Learning outcomes: To give theoretical knowledge in stochastic modelling and managing of insurance risk process and the elements of ruin theory.	
Brief outline of the course: The conception of risk in insurance. Classification of risks. Individual and collective risk models. Probability distributions of individual claims. Distribution of the total number of claims and of the of aggregated claim size. Compound distributions, their characteristics and moment generating functions. Mixed distributions (Pólya, Waring, Delaporte) and their use. Distribution of extremal claims (Fréchet, Weibull, Gumbel, Pareto). The ruin problem. The risk process as special random process. Cramér- Lundberg model and its modification. Ruin probability approximations. Bayes 's methods in risk theory and the princip of credibility. Risk management using reinsurance and bonus-malus systems.	
Recommended literature: 1. Buhlmann H.: Mathematical Methods in Risk Theory, Springer, Berlin, 1996. 2. Daykin at al.: Practical risk theory for actuarial. Chapman and Hall, 1994. 3. Embrechts at l.: Modelling extremal events for insurance and finance. Springer, 1997. 4. Horáková a kol.: Teória rizika v poistení. Wolters Kluwer, Bratislava, 2015. 5. Mikosch T.: Non-Life Insurance Mathematics, Springer, Berlin, 2009.	
Course language: Slovak	
Notes: ???	

Course assessment					
Total number of assessed students: 18					
A	B	C	D	E	FX
22.22	22.22	22.22	16.67	11.11	5.56
Provides: Mgr. Katarína Lučivjanská, PhD.					
Date of last modification: 19.04.2022					
Approved: prof. RNDr. Katarína Cechlárová, DrSc.					

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

2. ČECHOVSKÁ, I., MILEROVÁ, H., NOVOTNÁ, V. Aqua-fitness. Praha: Grada. 136 s.
3. EVANS, M., HUDSON, J., TUCKER, P. 2001. Umění harmonie: meditace, jóga, tai-či, strečink. 192 s.
4. JARKOVSKÁ, H., JARKOVSKÁ, M. 2005. Posilování s vlastním tělem 417 krát jinak. Praha: Grada. 209 s.
5. KOVAŘÍKOVÁ, K. 2017. Aerobik a fitness. Karolium, 130 s.

Course language:

Slovak language

Notes:

Course assessment

Total number of assessed students: 54

abs	n
11.11	88.89

Provides: Mgr. Agata Dorota Horbacz, PhD.

Date of last modification: 29.03.2022

Approved: prof. RNDr. Katarína Cechlárová, DrSc.

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice	
Faculty: Faculty of Science	
Course ID: ÚINF/ OPS1/15	Course name: Security of computer 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: 4.	
Course level: II.	
Prerequisites:	
Conditions for course completion: Homeworks, active participation in laboratory exercises, midterm test. Final written exam, oral examination.	
Learning outcomes: Understand the importance and possibilities of information systems security, system and network security threats. To be able to detect security threats in the implementation of the Internet, to be able to configure and use security gateways and proxy servers. Understand the principle and risks of SSL and IPsec security protocols and know how to use them.	
Brief outline of the course: <ol style="list-style-type: none"> 1. IS security principles, assets, threats, risks, attacks, the role of network and communication security, security objectives, functions and mechanisms. 2. Data transfer methods, technological and theoretical limits, transmission media, vulnerabilities and security threats. 3. Security threats of data transmission at the communication level of the communication model, data flow management in local networks, switching, STP, virtualization, MACsec, multiprotocol switching. 4. Security specifics of wireless transmission, WLAN networks, authentication mechanisms for WDS, data transmissions via mobile networks (GSM, LTE). 5. Remote access to the local network, EAP authentication, RADIUS protocol, trust management, certificate usage, certification process, certification authority tasks. 6. Security of IPv4 and IPv6 network protocols, possible attacks and protection, IPsec protocol, security associations and policies, exchange of cryptographic information. 7. Vulnerabilities of TCP and UDP transport protocols, TLS protocol, data security in TLS sessions, tunneling, VPN. 8. Security aspects of Internet application layer protocols, telnet, FTP, use of SSH protocol. 9. HTTP vulnerabilities, CSP, XSS content protection, code embedding, browser and server level protection, current implementation attacks. 10. Secure e-mail, MIME and S/MIME extensions, digitally signed and encrypted messages, security of mail servers, filtering of malicious content. 11. Internet, DNS and DNSSEC network security, DHCP, SNMPv3. 	

12. Connection filtering, proxy servers, hidden networking, NAT, NPT.					
13. Security gate architecture, demilitarized zone, filtering rules, intrusion detection and prediction at the security gate level.					
Recommended literature:					
1. Paul C. van Oorschot: Computer Security and the Internet: Tools and Jewels, Springer, 2020					
2. W. Stallings: Cryptography & Network Security, Pearson Education, 7th edition, 2017					
3. L. Dostálek: Velký průvodce protokoly TCP/IP - bezpečnost, Computer Press 2003					
Course language:					
Slovak or English					
Notes:					
Course assessment					
Total number of assessed students: 23					
A	B	C	D	E	FX
30.43	17.39	13.04	13.04	21.74	4.35
Provides: RNDr. Rastislav Krivoš-Belluš, PhD., doc. RNDr. Jozef Jirásek, PhD.					
Date of last modification: 08.01.2022					
Approved: prof. RNDr. Katarína Cechlárová, DrSc.					

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice	
Faculty: Faculty of Science	
Course ID: ÚMV/ VKP/10	Course name: Selected topics in probability
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: 5	
Recommended semester/trimester of the course: 1.	
Course level: II.	
Prerequisites:	
Conditions for course completion: Evaluation is based on written and oral part of the exam.	
Learning outcomes: Perspective of probability from the standpoint of measure theory. Understanding of most important results of probability theory.	
Brief outline of the course: <ul style="list-style-type: none"> • Probability and measure <ul style="list-style-type: none"> o Set systems, random variables and measure o Distribution functions and their properties o Independence o Radon-Nikodym derivative of measure • Characteristics of random variables <ul style="list-style-type: none"> o Moment characteristics o Characteristic and generating functions o Quantile characteristics o Conditional densities and conditional mean values o Transformations of random variables, convolutions • Important probability distributions <ul style="list-style-type: none"> o Discrete distributions o Absolute continuous distributions • Convergence of sequences of random variables <ul style="list-style-type: none"> o Types of convergence (a.s., L_p, P, D) o Laws of large numbers o Central limit theorems 	
Recommended literature: <ul style="list-style-type: none"> • Štěpán: Teorie pravděpodobnosti, Academia, 1987 • Loeve: Probability theory, Van Nostrand, 1960 • Rényi: Foundations of Probability, Holden-Day, 1970 • Athreya, Lahiri: Measure Theory and Probability Theory, Springer, 2006 	

Course language: Slovak					
Notes:					
Course assessment Total number of assessed students: 62					
A	B	C	D	E	FX
9.68	12.9	12.9	16.13	37.1	11.29
Provides: prof. RNDr. Ivan Žežula, CSc.					
Date of last modification: 19.04.2022					
Approved: prof. RNDr. Katarína Cechlárová, DrSc.					

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice		
Faculty: Faculty of Science		
Course ID: KPPaPZ/SPVKE/07	Course name: Social-Psychological Training of Coping with Critical Life Situations	
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: II.		
Prerequisites:		
Conditions for course completion:		
Learning outcomes:		
Brief outline of the course:		
Recommended literature:		
Course language:		
Notes:		
Course assessment Total number of assessed students: 126		
abs	n	z
97.62	2.38	0.0
Provides: Mgr. Ondrej Kalina, PhD.		
Date of last modification: 24.06.2022		
Approved: prof. RNDr. Katarína Cechlárová, DrSc.		

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: present	
Number of ECTS credits: 2	
Recommended semester/trimester of the course: 1.	
Course level: I., I.II., II.	
Prerequisites:	
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: BENCE, M. et al. 2005. Plávanie. Banská Bystrica: FHV UMB. 198s. ISBN 80-8083-140-8. [online] Dostupné na: https://www.ff.umb.sk/app/cmsFile.php?disposition=a&ID=571 BUZKOVÁ, K. 2006. Fitness jóga, harmonické cvičení těla I duše. Praha: Grada. ISBN 8024715252. JARKOVSKÁ, H, JARKOVSKÁ, M. 2005. Posilování s vlastním tělem 417 krát jinak. Praha: Grada. ISBN 9788024757308. KAČÁNI, L. 2002. Futbal:Tréning hrou. Bratislava: Peter Mačura – PEEM. 278s. ISBN 8089197027.	

KRESTA, J. 2009. Futsal. Praha: Grada Publishing, a.s. 112s. ISBN 9788024725345.
 LAWRENCE, G. 2019. Power jóga nejen pro sportovce. Brno: CPress. ISBN 9788026427902.
 SNER, Wolfgang. 2004. Posilování ve fitness. České Budějovice: Kopp. ISBN 8072322141.
 STACKEOVÁ, D. 2014. Fitness programy z pohledu kinantropologie. Praha: Galén. ISBN 9788074921155.
 VOMÁČKO, S. BOŠTÍKOVÁ, S. 2003. Lezení na umělých stěnách. Praha: Grada. 129s. ISBN 8024721743.

Course language:

Slovak language

Notes:

Course assessment

Total number of assessed students: 14548

abs	abs-A	abs-B	abs-C	abs-D	abs-E	n	neabs
86.46	0.07	0.0	0.0	0.0	0.05	8.41	5.02

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

Date of last modification: 29.03.2022

Approved: prof. RNDr. Katarína Cechlárová, DrSc.

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: present	
Number of ECTS credits: 2	
Recommended semester/trimester of the course: 2.	
Course level: I., I.II., II.	
Prerequisites:	
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: BENEC, M. et al. 2005. Plávanie. Banská Bystrica: FHV UMB. 198s. ISBN 80-8083-140-8. [online] Dostupné na: https://www.ff.umb.sk/app/cmsFile.php?disposition=a&ID=571 BUZKOVÁ, K. 2006. Fitness jóga, harmonické cvičení těla I duše. Praha: Grada. ISBN 8024715252. JARKOVSKÁ, H, JARKOVSKÁ, M. 2005. Posilování s vlastním tělem 417 krát jinak. Praha: Grada. ISBN 9788024757308. KAČÁNI, L. 2002. Futbal:Trénink hrou. Bratislava: Peter Mačura – PEEM. 278s. ISBN 8089197027. KRESTA, J. 2009. Futsal.Praha: Grada Publishing, a.s. 112s. ISBN 9788024725345.	

LAWRENCE, G. 2019. Power jóga nejen pro sportovce. Brno: CPress. ISBN 9788026427902.
 SNER, Wolfgang. 2004. Posilování ve fitness. České Budějovice: Kopp. ISBN 8072322141.
 STACKEOVÁ, D. 2014. Fitness programy z pohledu kinantropologie. Praha: Galén. ISBN 9788074921155.
 VOMÁČKO, S. BOŠTÍKOVÁ, S. 2003. Lezení na umělých stěnách. Praha: Grada. 129s. ISBN 8024721743.

Course language:

Slovak language

Notes:

Course assessment

Total number of assessed students: 13211

abs	abs-A	abs-B	abs-C	abs-D	abs-E	n	neabs
84.35	0.51	0.02	0.0	0.0	0.05	10.78	4.29

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

Date of last modification: 29.03.2022

Approved: prof. RNDr. Katarína Cechlárová, DrSc.

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: present	
Number of ECTS credits: 2	
Recommended semester/trimester of the course: 3.	
Course level: I., I.II., II.	
Prerequisites:	
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: BENCE, M. et al. 2005. Plávanie. Banská Bystrica: FHV UMB. 198s. ISBN 80-8083-140-8. [online] Dostupné na: https://www.ff.umb.sk/app/cmsFile.php?disposition=a&ID=571 BUZKOVÁ, K. 2006. Fitness jóga, harmonické cvičení těla I duše. Praha: Grada. ISBN 8024715252. JARKOVSKÁ, H, JARKOVSKÁ, M. 2005. Posilování s vlastním tělem 417 krát jinak. Praha: Grada. ISBN 9788024757308. KAČÁNI, L. 2002. Futbal:Tréníng hrou. Bratislava: Peter Mačura – PEEM. 278s. ISBN 8089197027. KRESTA, J. 2009. Futsal.Praha: Grada Publishing, a.s. 112s. ISBN 9788024725345.	

LAWRENCE, G. 2019. Power jóga nejen pro sportovce. Brno: CPress. ISBN 9788026427902.
 SNER, Wolfgang. 2004. Posilování ve fitness. České Budějovice: Kopp. ISBN 8072322141.
 STACKEOVÁ, D. 2014. Fitness programy z pohledu kinantropologie. Praha: Galén. ISBN 9788074921155.
 VOMÁČKO, S. BOŠTÍKOVÁ, S. 2003. Lezení na umělých stěnách. Praha: Grada. 129s. ISBN 8024721743.

Course language:

Slovak language

Notes:

Course assessment

Total number of assessed students: 8879

abs	abs-A	abs-B	abs-C	abs-D	abs-E	n	neabs
88.62	0.07	0.01	0.0	0.0	0.02	4.25	7.03

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

Date of last modification: 29.03.2022

Approved: prof. RNDr. Katarína Cechlárová, DrSc.

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: present	
Number of ECTS credits: 2	
Recommended semester/trimester of the course: 4.	
Course level: I., I.II., II.	
Prerequisites:	
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: BENEC, M. et al. 2005. Plávanie. Banská Bystrica: FHV UMB. 198s. ISBN 80-8083-140-8. [online] Dostupné na: https://www.ff.umb.sk/app/cmsFile.php?disposition=a&ID=571 BUZKOVÁ, K. 2006. Fitness jóga, harmonické cvičení těla I duše. Praha: Grada. ISBN 8024715252. JARKOVSKÁ, H, JARKOVSKÁ, M. 2005. Posilování s vlastním tělem 417 krát jinak. Praha: Grada. ISBN 9788024757308. KAČÁNI, L. 2002. Futbal:Trénink hrou. Bratislava: Peter Mačura – PEEM. 278s. ISBN 8089197027. KRESTA, J. 2009. Futsal.Praha: Grada Publishing, a.s. 112s. ISBN 9788024725345.	

LAWRENCE, G. 2019. Power jóga nejen pro sportovce. Brno: CPress. ISBN 9788026427902.
 SNER, Wolfgang. 2004. Posilování ve fitness. České Budějovice: Kopp. ISBN 8072322141.
 STACKEOVÁ, D. 2014. Fitness programy z pohledu kinantropologie. Praha: Galén. ISBN 9788074921155.
 VOMÁČKO, S. BOŠTÍKOVÁ, S. 2003. Lezení na umělých stěnách. Praha: Grada. 129s. ISBN 8024721743.

Course language:

Slovak language

Notes:

Course assessment

Total number of assessed students: 5628

abs	abs-A	abs-B	abs-C	abs-D	abs-E	n	neabs
82.66	0.28	0.04	0.0	0.0	0.0	8.05	8.97

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

Date of last modification: 29.03.2022

Approved: prof. RNDr. Katarína Cechlárová, DrSc.

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice	
Faculty: Faculty of Science	
Course ID: ÚMV/ NPR/19	Course name: Stochastic processes
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: 2.	
Course level: II.	
Prerequisites:	
Conditions for course completion: Total evaluation based on a written test (30p) + individual project work (30p) and oral exam (40p). At least 50% must be obtained from each part. Final evaluation: $\geq 90\%$ A; $\geq 80\%$ B; $\geq 70\%$ C; $\geq 60\%$ D; $\geq 50\%$ E; $< 50\%$ FX.	
Learning outcomes: To obtain knowledge of the stationary stochastic processes analysis in time domain and spectral domain. To study properties of random processes with discrete time (time series) and continuous time and their application in finance. To obtain skills in time series analysis with software R.	
Brief outline of the course: 1.-2. Stationary process, linear process. 3. Causal and invertible process. 4. Time domain analysis (autocovariance, autocorrelation and partial autocorrelation function). 5. Sample characteristic of time series and their properties. 6.-7. Frequency domain analysis (spectral density and distribution function, periodogram). 8. Prediction of time series. 9. Random processes with continuous time (fundamental concepts). 10. Brownian motion, Itô's process, Itô's lemma and its application. 11.-12. The Black-Scholes formula.	
Recommended literature: 1. Brockwell P., Davis R.: Introduction to Time Series and Forecasting, 3rd ed., Springer, New York, 2016 2. Prášková Z.: Základy náhodných procesů II, Karolinum, Praha, 2004 (in Czech) 3. Tsay R.: Analysis of Financial Time Series, 3rd ed., Wiley Interscience, New Jersey, 2010 4. Shumway R., Stoffer D.: Time Series Analysis and Its Applications with R Examples, 4th ed., Springer, New York, 2017 5. Melicherčík I., Olšarová L., Úradníček V.: Kapitoly z finančnej matematiky, Epos, Bratislava, 2005 (in Slovak) 6. Oksendal B.K.: Stochastic Differential Equations, 6th ed., Springer, 2014	

Course language: Slovak					
Notes: The students are required to have basic knowledge about random vectors and their characteristics, conditional distribution, estimation theory and hypothesis testing.					
Course assessment Total number of assessed students: 78					
A	B	C	D	E	FX
39.74	23.08	17.95	10.26	6.41	2.56
Provides: doc. RNDr. Martina Hančová, PhD.					
Date of last modification: 19.04.2022					
Approved: prof. RNDr. Katarína Cechlárová, DrSc.					

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice	
Faculty: Faculty of Science	
Course ID: ÚFV/SEV/10	Course name: Structure and Evolution of the Universe
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: 2.	
Course level: I., II.	
Prerequisites:	
Conditions for course completion: To successfully complete the course, the student must demonstrate sufficient understanding of the basic knowledge of the structure and evolution of the universe. Knowledge of the basic properties of stars and methods of their determination, the structure, evolution and energy sources of stars, the structure of matter in the universe and its evolution is required. The condition for obtaining credits is passing a written or oral exam, preparation, and presentation of a semester essay. The credit evaluation of the course considers the following student workload: direct teaching (1 credit), self-study (2 credit) and assessment (1 credits). The minimum threshold for completing the course is to obtain at least 50% of the total score, using the following rating scale: A (90-100%), B (80-89%), C (70-79%), D (60- 69%), E (50-59%), Fx (0-49%).	
Learning outcomes: After completing the lectures, the student will master the basic knowledge about the properties of stars and methods of their determination, structure, evolution and energy sources of stars, the structure of matter in the universe and its evolution. It will also have sufficient physical knowledge and mathematical apparatus to enable independent solving of a wide range of tasks related to space research.	
Brief outline of the course: <ol style="list-style-type: none"> 1. Basic properties of stars and methods of their determination: radiation flux, apparent and absolute magnitude, distances of stars, colors of stars. 2. Temperature of stars, black body radiation, spectra of atoms and molecules, non-thermal radiation. 3. Spectral classifications, luminosity classes, HR diagram, masses of stars. 4. Structure of stars: basic equations of stellar structure, transfer of energy by radiation and convection, production of energy in stars, fusion reactions. 5. Evolution of stars: interstellar matter and formation of stars and stellar systems, Jeans' criterion, protostars. 6. Evolution of stars: main sequence stars, giants, final stages of star evolution - white dwarfs, neutron stars and black holes. 7. Distribution of matter in the universe: Milky Way, its structure, dynamics, and evolution, types of galaxies, quasars, intergalactic matter, local group of galaxies. 	

8. Clusters and super-clusters of galaxies, large-scale structure of the universe, dark matter, and dark energy.
9. Evolution of the universe: historical development of views on the universe, Olbers's paradox, gravitational paradox, Cosmological principle.
10. Isotropy and homogeneity of the universe, relic radiation, expansion of the universe. Steady state theory.
11. Relativistic cosmology: cosmological solutions of Einstein's equations, models of the universe and their properties, theory of the expanding universe, the Big Bang, the age of the universe.
12. Origin of the universe: the initial stages of the expansion of the universe, inflationary expansion and nucleogenesis, the formation of galaxies and galaxy clusters.

Recommended literature:

1. Carroll, B. W., Ostlie, D. A., An Introduction to Modern Astrophysics, Addison-Wesley Publishing Company, Reading, Massachusetts, 1996;
2. Contopoulos, D. Kotsakis, Cosmology, the structure and evolution of the Universe, Springer, 1984;
3. Pasachoff, J.M., Filippenko, A., The Cosmos: Astronomy in the New Millennium, Cambridge University Press, 2013;
4. Vanýsek, V., Základy astronomie a astrofyziky, Academia, Praha, 1980;
5. Čeman, R., Pittich, E., Vesmír 1 - Slnečná sústava, MAPA Slovakia, Bratislava, 2002;
6. Čeman, R., Pittich, E., Vesmír 2 - Hviezdy - Galaxie, MAPA Slovakia, Bratislava, 2003;

Course language:

Slovak, English

Notes:

Course assessment

Total number of assessed students: 140

A	B	C	D	E	FX
35.71	28.57	14.29	11.43	10.0	0.0

Provides: doc. RNDr. Rudolf Gális, PhD.

Date of last modification: 20.09.2021

Approved: prof. RNDr. Katarína Cechlárová, DrSc.

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.	
Prerequisites:	
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: 17	
abs	n
100.0	0.0
Provides:	
Date of last modification: 01.12.2021	
Approved: prof. RNDr. Katarína Cechlárová, DrSc.	

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: 2 Per study period: 28 Course method: present	
Number of ECTS credits: 2	
Recommended semester/trimester of the course:	
Course level: I., II.	
Prerequisites:	
Conditions for course completion: Completion: passed Condition for successful course completion: - active participation in line with the study rule of procedure and course guidelines - effective performance of all tasks: carrying a canoe, entering and exiting a canoe, righting a canoe, paddling	
Learning outcomes: Content standard: The student demonstrates relevant knowledge and skills in the field, which content is defined in the course syllabus and recommended literature. Performance standard: Upon completion of the course students are able to meet the performance standard and: - implement the acquired knowledge in different situations and practice, - implement basic skills to manipulate a canoe on a waterway, - determine the right spot for camping, - prepare a suitable material and equipment for camping.	
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: 1. JUNGER, J. et al. Turistika a športy v prírode. Prešov: FHPV PU v Prešove. 2002. ISBN 8080680973. Internetové zdroje: 1. STEJSKAL, T. Vodná turistika. Prešov: PU v Prešove. 1999. Dostupné na: https://ulozto.sk/tamhle/UkyxQ2lYF8qh/name/Nahrane-7-5-2021-v-14-46-39#!ZGDjBGR2AQtkAzVkAzLkLJWuLwWxZ2ukBRLjnGqSomICMmOyZN==	
Course language: Slovak language	
Notes:	
Course assessment Total number of assessed students: 209	
abs	n
37.32	62.68
Provides: Mgr. Dávid Kaško, PhD.	
Date of last modification: 29.03.2022	
Approved: prof. RNDr. Katarína Cechlárová, DrSc.	

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice					
Faculty: Faculty of Science					
Course ID: ÚMV/ SDP/18		Course name: Tax and insurance administration in practice			
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: 5					
Recommended semester/trimester of the course: 2., 4.					
Course level: II.					
Prerequisites:					
Conditions for course completion: Elaboration of projects focused on the application of information systems in tax administration and insurance.					
Learning outcomes: To obtain basic informations on Information system development. To learn tax system in Slovak Republic.					
Brief outline of the course: ???					
Recommended literature: Booch G., Jacobson I., Rumbaugh J.: The Unified Modeling Language user Guide, Addison-Wesley, 1998 Tax laws of the Slovak Republic					
Course language: Slovak					
Notes: ???					
Course assessment Total number of assessed students: 66					
A	B	C	D	E	FX
65.15	13.64	16.67	0.0	4.55	0.0
Provides: doc. RNDr. Roman Soták, PhD., RNDr. Pavol Huraj					
Date of last modification: 19.04.2022					
Approved: prof. RNDr. Katarína Cechlárová, DrSc.					

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice					
Faculty: Faculty of Science					
Course ID: ÚMV/ TKO/10		Course name: Theory of codes			
Course type, scope and the method: Course type: Lecture Recommended course-load (hours): Per week: 4 Per study period: 56 Course method: present					
Number of ECTS credits: 6					
Recommended semester/trimester of the course: 1., 3.					
Course level: II.					
Prerequisites:					
Conditions for course completion: A student is evaluated according to an oral examination during which he/she answers two questions chosen by him/her at random, one from the group A and one from the group B (both for 50 points at maximum). Evaluation scale: A ... 90-100 p., B ... 80-89 p., C ... 70-79 p., D ... 60-69 p., E ... 50-59 p., FX ... 0-49 p.					
Learning outcomes: A student gets acquainted with basic principles and theoretical bases of text coding and possibilities of their application.					
Brief outline of the course: Monoids (1 week). Basic notions of theory of codes, examples of codes (2 weeks). Submonoids generated by codes (1 week). Stable submonoids (1 week). Group codes (1 week). Test for recognising codes (2 weeks). Measure of a code (1 week). Bernoulli distribution (3 weeks). Dyck code (1 week).					
Recommended literature: J. Berstel and D. Perrin, Theory of Codes, Academic Press, 1985					
Course language: Slovak					
Notes:					
Course assessment Total number of assessed students: 25					
A	B	C	D	E	FX
44.0	16.0	4.0	4.0	20.0	12.0
Provides: prof. RNDr. Mirko Horňák, CSc.					
Date of last modification: 31.01.2022					
Approved: prof. RNDr. Katarína Cechlárová, DrSc.					