Course descriptions

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COURSE DESCRIPTION

Academic year: 2025/2026	
University: Comenius University Bratislava	
Faculty: Faculty of Mathematics, Physics and Informatics	
Course ID: FMFI.KAMŠ/2-PMS-224/22	**Course title:** Applied data science in SAS Viya
Educational activities: **Type of activities:** course **Number of hours:** **per week:** 2 **per level/semester:** 26 **Form of the course:** on-site learning	
Number of credits: 2	
Recommended semester: 2., 4.	
Educational level: II.	
Prerequisites:	
Recommended prerequisites: It is recommended to have completed the courses 2-PMS-222 Programming in SAS and 2-PMS-107 Regression models and to be enrolled in (or have completed) the course 2-PMS-216 Cluster analysis and data classification.	
Course requirements: Evaluation based on: project Approximate grade thresholds: A 90%, B 80%, C 70%, D 60%, E 50% Scale of assessment (preliminary/final): 100/0	
Learning outcomes: Students will acquire practical knowledge about data processing and various statistical models in SAS Viya.	
Class syllabus: 1. Basic overview of the SAS Viya environment. 2. Regression model creation (linear, logistic, GLM, …). 3. Segmentation models and clustering. 4. Basics of practical machine learning (supervised and unsupervised). 5. Comparison of performance of models of different types and best-practice for model quality monitoring.	
Recommended literature: Pinheiro C. A. R., Patetta M.: Introduction to Statistical and Machine Learning Methods for Data Science, SAS Institute 2021	
Languages necessary to complete the course: Slovak, English	
Notes: Learning materials will be available in digital form. Enrollment limit: 25 students	

Past grade distribution
Total number of evaluated students: 6

A	B	C	D	E	FX
33,33	50,0	16,67	0,0	0,0	0,0

Lecturers: Mgr. Jozef Kováč, PhD., Mgr. Ivan Kasanický, PhD.

Last change: 12.03.2022

Approved by: doc. Mgr. Radoslav Harman, PhD.

COURSE DESCRIPTION

Academic year: 2025/2026

University: Comenius University Bratislava

Faculty: Faculty of Mathematics, Physics and Informatics

Course ID:	**Course title:**
FMFI.KAI/2-MXX-133/23	Artificial Intelligence for Everyone

Educational activities:
Type of activities: training session / course
Number of hours:
per week: 9 **per level/semester:** 1t / 117
Form of the course: on-site learning

Number of credits: 6

Recommended semester:

Educational level: II.

Prerequisites:

Course requirements:

Learning outcomes:

Class syllabus:

Recommended literature:

Languages necessary to complete the course:

Notes:

Past grade distribution
Total number of evaluated students: 22

A	B	C	D	E	FX
45,45	36,36	4,55	9,09	4,55	0,0

Lecturers: prof. Ing. Igor Farkaš, Dr.

Last change:

Approved by: doc. Mgr. Radoslav Harman, PhD.

COURSE DESCRIPTION

Academic year: 2025/2026

University: Comenius University Bratislava

Faculty: Faculty of Mathematics, Physics and Informatics

Course ID:	**Course title:**
FMFI.KAMŠ/2-PMS-213/22	Bayesian Methods (1)

Educational activities:
Type of activities: lecture
Number of hours:
per week: 2 **per level/semester:** 26
Form of the course: on-site learning

Number of credits: 3

Recommended semester: 3.

Educational level: II.

Prerequisites:

Course requirements:
Preliminary semester evaluation: exam;
Examination: test and oral examination;
Approximate grade thresholds: A 90%, B 80%, C 70%, D 60%, E 50%
Scale of assessment (preliminary/final): 30/70

Learning outcomes:
Students will be introduced to the basic notions, concepts and principles of Bayesian statistics.

Class syllabus:
Bayes' theorem, prior and posterior predictive distributions, statistical decision theory and its application in Bayesian estimation and Bayesian testing, credible intervals, conjugate prior distributions, noninformative priors, information, entropy, I-divergence.

Recommended literature:
Hoff P.D.: A first course in Bayesian statistical methods. New York: Springer 2009.;
Pázman A.: Bayesovská štatistika, Bratislava: Univerzita Komenského 2009;

Languages necessary to complete the course:
Slovak, English

Notes:
Enrollment limit: 25 students

Past grade distribution
Total number of evaluated students: 219

A	B	C	D	E	FX
21,92	15,98	25,57	19,18	15,53	1,83

Lecturers: Mgr. Jozef Kováč, PhD., doc. Mgr. Radoslav Harman, PhD.

Last change: 10.03.2022

Approved by: doc. Mgr. Radoslav Harman, PhD.

COURSE DESCRIPTION

Academic year: 2025/2026

University: Comenius University Bratislava

Faculty: Faculty of Mathematics, Physics and Informatics

Course ID:	**Course title:**
FMFI.KAMŠ/2-PMS-214/22	Bayesian Methods (2)

Educational activities:
Type of activities: lecture
Number of hours:
per week: 2 **per level/semester:** 26
Form of the course: on-site learning

Number of credits: 2

Recommended semester: 4.

Educational level: II.

Prerequisites:

Course requirements:
homework

Learning outcomes:
Students will gain an overview of practical applications of Bayesian methods and will be able to use them in R software.

Class syllabus:
MCMC in Bayesian methods, Metropolis-Hastings algorithm, Gibbs algorithm, Bayesian regression, hierarchical models, model validation, model averaging, Bayesian networks, Bayesian methods in machine learning.

Recommended literature:
Lambert B.: A Student's Guide to Bayesian Statistics. California: Sage 2018;
Hoff P.D.: A first course in Bayesian statistical methods. New York: Springer 2009;
Neapolitan R.E.: Learning Bayesian networks. New Jersey: Pearson Prentice Hall 2004.

Languages necessary to complete the course:
Slovak, English

Notes:
Enrollment limit: 25 students

Past grade distribution
Total number of evaluated students: 30

A	B	C	D	E	FX
53,33	23,33	10,0	10,0	3,33	0,0

Lecturers: Mgr. Jozef Kováč, PhD., doc. Mgr. Radoslav Harman, PhD.

Last change: 03.05.2023

Approved by: doc. Mgr. Radoslav Harman, PhD.

COURSE DESCRIPTION

Academic year: 2025/2026

University: Comenius University Bratislava

Faculty: Faculty of Mathematics, Physics and Informatics

Course ID:	**Course title:**
FMFI.KAMŠ/2-PMS-136/22	Biostatistics

Educational activities:
Type of activities: lecture
Number of hours:
per week: 2 **per level/semester:** 26
Form of the course: on-site learning

Number of credits: 3

Recommended semester: 2.

Educational level: II.

Prerequisites:

Recommended prerequisites:
Multivariate statistical analyses 2-PMS-115; Regression models 2-PMS-107

Course requirements:
Evaluation based on: project (teaching period)
Approximate grade thresholds: A 90%, B 80%, C 70%, D 60%, E 50%
Scale of assessment (preliminary/final): 100/0

Learning outcomes:
The students will gain knowledge about selected statistical methods used in biomedical applications.

Class syllabus:
Fixed and random effects models; Analysis of variance with random effects; Linear models with random effects; Metaanalysis and metaregression; Repeated and longitudinal measurements; Diagnostic tests, sensitivity, specificity and combined measures of accuracy; ROC curves and their characteristics.

Recommended literature:
Gałecki A, Burzykowski T.: Linear mixed-effects model Using R. Springer, New York, NY (2013); Filová L: Biostatistics, study materials of the lecturer, 2021.

Languages necessary to complete the course:
Slovak, English

Notes:

Past grade distribution
Total number of evaluated students: 46

A	B	C	D	E	FX
56,52	26,09	17,39	0,0	0,0	0,0

Lecturers: doc. Mgr. Lenka Filová, PhD.

Last change: 16.06.2022
Approved by: doc. Mgr. Radoslav Harman, PhD.

COURSE DESCRIPTION

Academic year: 2025/2026

University: Comenius University Bratislava

Faculty: Faculty of Mathematics, Physics and Informatics

Course ID:	**Course title:**
FMFI.KAMŠ/2-PMS-130/10	Categorial Data Analysis

Educational activities:
Type of activities: lecture
Number of hours:
per week: 2 **per level/semester:** 26
Form of the course: on-site learning

Number of credits: 3

Recommended semester: 3.

Educational level: II.

Prerequisites:

Course requirements:
project (teaching period), written exam
Approximate grade thresholds: A 90%, B 80%, C 70%, D 60%, E 50%
Scale of assessment (preliminary/final): 50/50

Learning outcomes:
The students understand the principles of modeling of non-numeric data and the maximum likelihood inference in such models. They also realize that many seemingly unrelated classical methods of categorical data analysis are just special cases of a simple and unified approach by means of generalized linear models.

Class syllabus:
1. Maximum likelihood method in the world of cathegorical data: the Holy Trinity (Wald test, score test, likelihood ratio test). Corresponding confidence intervals for the binomial parameter (Wald's, Wilson's, Agresti-Coull's, based on the likelihood ratio test).
2. Inference about a vector parameter: the Holy Trinity of tests, the Pearson's chi-squared test and the connection between them, a multinomial example.
3. Contingency table: connection with the multinomial distribution, testing of general hypotheses about the parameters, independence testing.
4.
Delta-method: the principle, demonstrations contingency tables in case of inference about odds and odd ratio.
5. Measures of correlation of non-numeric variables (Goodman-Kruskal gamma).
6. Equivalence between the multinomial models of contingency tables and the corresponding Poisson log-linear model.
7. Poisson log-linear model: interpretation of parameters, the saturated model, deviance.
8. Saturated 3-way Poisson log-linear model: interpretation of parameters, visualization using a mosaic plot, interpretation and testing of submodels, confidence intervals for parameters.
9. A test about the odds ratio, the Cochran-Mantel-Haenszel test and the Woolf's test in 3-dimensional 2x2xK contingency tables as tests about submodels of a Poisson log-linear model.
10. Logistic and multinomial regression as special cases of a Poisson log-linear model.

Recommended literature:
Agresti A: Categorical Data Analysis 3rd ed. Wiley 2012.

Languages necessary to complete the course:
Slovak, English

Notes:

Past grade distribution
Total number of evaluated students: 172

A	B	C	D	E	FX
61,63	20,93	8,72	3,49	5,23	0,0

Lecturers: Mgr. Ján Somorčík, PhD., doc. Mgr. Lenka Filová, PhD.

Last change: 11.03.2022

Approved by: doc. Mgr. Radoslav Harman, PhD.

COURSE DESCRIPTION

Academic year: 2025/2026	
University: Comenius University Bratislava	
Faculty: Faculty of Mathematics, Physics and Informatics	
Course ID: FMFI.KAMŠ/2-PMS-116/19	**Course title:** Cluster analysis and data classification
Educational activities: **Type of activities:** lecture / practicals **Number of hours:** **per week:** 2 / 2 **per level/semester:** 26 / 26 **Form of the course:** on-site learning	
Number of credits: 5	
Recommended semester: 2.	
Educational level: II.	
Prerequisites:	
Course requirements: Evaluation based on: project (teaching period), oral exam Approximate grade thresholds: A 90%, B 80%, C 70%, D 60%, E 50% Scale of assessment (preliminary/final): 50/50	
Learning outcomes: The students understand the principles and practical realization of selected methods of cluster analysis and statistical data classification.	
Class syllabus: Selected multivariate data visualization methods, partitional clustering (k-means, k-medoids, DBSCAN, OPTICS, clustering based on the mixture of Gaussian distributions, spectral clustering), hierarchical clustering, general introduction to the statistical classification methods, Bayes classifier, k nearest neighbors, linear and quadratic discrimination, classification trees and forests, bagging and boosting, support vector machines, multinomial regression as a classification method	
Recommended literature: Izenman A: Modern Multivariate Statistical Techniques: Regression, Classification, and Manifold Learning (Springer Texts in Statistics) 1st ed., 2nd printing 2013; James G, Witten D, Hastie T, Tibshirani R: An Introduction to Statistical Learning: with Applications in R (Springer Texts in Statistics) 2nd ed., Springer 2021; Harman R: Multivariate Statistical Analysis (Selected Lecture Notes), study materials of the lecturer, 2021.	
Languages necessary to complete the course: Slovak, English	
Notes: The knowledge of the software R is recommended. Enrollment limit: 40 students	

Past grade distribution Total number of evaluated students: 173					
A	B	C	D	E	FX
59,54	23,7	9,25	1,16	1,73	4,62
Lecturers: doc. Mgr. Radoslav Harman, PhD., Mgr. Samuel Rosa, PhD.					
Last change: 10.03.2022					
Approved by: doc. Mgr. Radoslav Harman, PhD.					

COURSE DESCRIPTION

Academic year: 2025/2026

University: Comenius University Bratislava

Faculty: Faculty of Mathematics, Physics and Informatics

Course ID:	**Course title:**
FMFI.KAMŠ/2-PMS-109/15	Computer Statistics

Educational activities:
Type of activities: lecture
Number of hours:
per week: 2 **per level/semester:** 26
Form of the course: on-site learning

Number of credits: 3

Recommended semester: 2.

Educational level: II.

Prerequisites:

Course requirements:
project (teaching period), oral exam
Approximate grade thresholds: A 90%, B 80%, C 70%, D 60%, E 50%
Scale of assessment (preliminary/final): 70/30

Learning outcomes:
Students will be able to perform some rather advanced statistical analyses, using the software R.

Class syllabus:
1. Contingency tables, graphical representation, test of independence, homogeneity test, odds ratio, McNemar's test, Simpson's paradox and the Cochran-Mantel-Haenszel test, Bowker's test, Fisher's exact test.
2. Logistic regression: interpretation of parameters, probability vs. odds, deviance, tests of submodels, Wald tests and confidence intervals, graphical representation, pseudo coefficients of determination, logistic regression as a classifier.
3. Permutation versions of the t-test and ANOVA.
4. Bootstrap: estimation of variation, confidence intervals, application to regression, a demonstration of misuse.

Recommended literature:
Agresti A: Categorical Data Analysis 3rd ed. W Agresti A: Categorical Data Analysis 3rd ed. Wiley 2012;
Anděl J: Statistické metody. Matfyzpress 2007.

Languages necessary to complete the course:
Slovak, English

Notes:

Past grade distribution Total number of evaluated students: 355					
A	B	C	D	E	FX
70,7	18,59	7,61	1,41	1,41	0,28
Lecturers: Mgr. Ján Somorčík, PhD., doc. Mgr. Lenka Filová, PhD.					
Last change: 11.03.2022					
Approved by: doc. Mgr. Radoslav Harman, PhD.					

COURSE DESCRIPTION

Academic year: 2025/2026

University: Comenius University Bratislava

Faculty: Faculty of Mathematics, Physics and Informatics

Course ID:	**Course title:**
FMFI.KAMŠ/2-EFM-117/12	Convex Optimisation

Educational activities:
Type of activities: lecture
Number of hours:
per week: 2 **per level/semester:** 26
Form of the course: on-site learning

Number of credits: 3

Recommended semester: 2., 4.

Educational level: II.

Prerequisites:

Recommended prerequisites:
Nonlinear programming, Linear programming

Course requirements:
Ongoing assessment: homework assignments (20%), in-class tests (30%)
Final assessment: semester project (20%), final exam (30%)
Grading A 91%, B 81%, C 71%, D 61%, E 51%
Scale of assessment (preliminary/final): 50% /50%

Learning outcomes:
Student learn the basic theory of convex analysis and convex (conic) optimization,
basic classes of convex conic programming, and methods for solving them, they learn the duality theory of conic linear programming. They are able to use Matlab and CVX (cvxopt) modeling system for solving convex problems, they are able to solve various practical problems and applications.

Class syllabus:
Convex optimization problems in standard form
Generalization of standard convex problems
Conic convex problems (SDP, SOCP,..)
Geometry of convex cones
Duality theory for conic linear programs
Applications of convex conic problems
Conic relaxations
Interior point methods

Recommended literature:
M. Trnovská: Konvexná optimalizácia, elektronický text.
Boyd, Vandenberghe: Convex Optimization, Cambridge Univ.Press 2004
CVX: Matlab Software for Disciplined Convex Programming www.stanford.edu/~boyd/cvxbook
Ben-Tal, Nemirovski: Lectures on Modern Convex Optimization, SIAM 2001

Languages necessary to complete the course:
Slovak, English

Notes:

Past grade distribution
Total number of evaluated students: 140

A	B	C	D	E	FX
68,57	15,0	9,29	2,14	2,86	2,14

Lecturers: doc. RNDr. Mária Trnovská, PhD., Mgr. Jakub Hrdina, PhD.

Last change: 14.07.2025

Approved by: doc. Mgr. Radoslav Harman, PhD.

COURSE DESCRIPTION

Academic year: 2025/2026

University: Comenius University Bratislava

Faculty: Faculty of Mathematics, Physics and Informatics

Course ID:	**Course title:**
FMFI.KAMŠ/2-PMS-142/22	Data Dimensionality Reduction

Educational activities:
Type of activities: lecture / practicals
Number of hours:
per week: 2 / 1 **per level/semester:** 26 / 13
Form of the course: on-site learning

Number of credits: 4

Recommended semester: 2.

Educational level: II.

Prerequisites:

Course requirements:
Evaluation based on: project (teaching period), oral exam
Approximate grade thresholds: A 90%, B 80%, C 70%, D 60%, E 50%
Scale of assessment (preliminary/final): 50/50

Learning outcomes:
The students will familiarize themselves with the methods of feature extraction and selection and with subsample selection. They will also acquire the ability to apply these methods in practical data analysis.

Class syllabus:
1. Linear methods of feature extraction – principal component analysis, factor analysis, projection pursuit.
2. Nonlinear methods of feature extraction – nonlinear principal component analysis, metric and nonmetric multidimensional scaling, isomap, t-SNE.
3. Feature selection methods – forward and backward selection, lasso, ridge regression.
4. Subsampling methods – random subsample, leveraging methods.

Recommended literature:
Izenman A: Modern Multivariate Statistical Techniques: Regression, Classification, and Manifold Learning (Springer Texts in Statistics) 1st ed., 2nd printing 2013;
James G, Witten D, Hastie T, Tibshirani R: An Introduction to Statistical Learning: with Applications in R (Springer Texts in Statistics) 2nd ed., Springer, 2021;
Hastie T, Tibshirani R, Friedman J: The Elements of Statistical Learning, 2nd ed., Springer, 2016

Languages necessary to complete the course:
Slovak, English

Notes:
An electronic version of "An Introduction to Statistical Learning" by James et al. is available at: https://www.statlearning.com/

Past grade distribution Total number of evaluated students: 151					
A	B	C	D	E	FX
45,7	27,81	14,57	4,64	3,31	3,97
Lecturers: Mgr. Samuel Rosa, PhD.					
Last change: 18.06.2022					
Approved by: doc. Mgr. Radoslav Harman, PhD.					

COURSE DESCRIPTION

Academic year: 2025/2026	
University: Comenius University Bratislava	
Faculty: Faculty of Mathematics, Physics and Informatics	
Course ID: FMFI.KAMŠ/2-PMS-108/19	**Course title:** Design of experiments
Educational activities: **Type of activities:** lecture / practicals **Number of hours:** **per week:** 2 / 2 **per level/semester:** 26 / 26 **Form of the course:** on-site learning	
Number of credits: 5	
Recommended semester: 2.	
Educational level: II.	
Prerequisites:	
Recommended prerequisites: Regression models 2-PMS-107	
Course requirements: Evaluation based on: project (teaching period), oral exam Approximate grade thresholds: A 90%, B 80%, C 70%, D 60%, E 50% Scale of assessment (preliminary/final): 40/60	
Learning outcomes: The students will learn about basic principles of designing statistical experiments and the optimization of the quality of experiments.	
Class syllabus: Basic principles of designing experiments, block designs, factorial designs, response surface designs, optimal experimental designs for linear models (exact and approximate design, optimality criteria, algorithmic computing of optimal designs), optimal design of experiments for nonlinear models.	
Recommended literature: Dean A, Voss D, Draguljic D: Design and Analysis of Experiments (Springer Texts in Statistics) 2nd ed., Springer 2017; Pázman A, Lacko V: Prednášky z regresných modelov - odhadovanie parametrov strednej hodnoty a štatistická optimalizácia experimentu, Univerzita Komenského 2012; A. Atkinson et al.: Optimum Experimental Design, with SAS. Oxford University Press 2007	
Languages necessary to complete the course: Slovak, English	
Notes: Enrollment limit: 20 students	

Past grade distribution Total number of evaluated students: 61					
A	B	C	D	E	FX
62,3	18,03	9,84	3,28	4,92	1,64
Lecturers: doc. Mgr. Lenka Filová, PhD., doc. Mgr. Radoslav Harman, PhD.					
Last change: 03.06.2025					
Approved by: doc. Mgr. Radoslav Harman, PhD.					

COURSE DESCRIPTION

Academic year: 2025/2026

University: Comenius University Bratislava

Faculty: Faculty of Mathematics, Physics and Informatics

Course ID:	**Course title:**
FMFI.KAMŠ/2-EFM-237/15	Digital Signal Processing

Educational activities:
Type of activities: lecture
Number of hours:
per week: 2 **per level/semester:** 26
Form of the course: on-site learning

Number of credits: 3

Recommended semester: 4.

Educational level: II.

Prerequisites:

Course requirements:

Learning outcomes:

Class syllabus:

Recommended literature:

Languages necessary to complete the course:

Notes:

Past grade distribution
Total number of evaluated students: 97

A	B	C	D	E	FX
71,13	17,53	5,15	1,03	0,0	5,15

Lecturers: Mgr. Miriam Kristeková, PhD.

Last change: 02.06.2015

Approved by: doc. Mgr. Radoslav Harman, PhD.

STATE EXAM DESCRIPTION

Academic year: 2025/2026	
University: Comenius University Bratislava	
Faculty: Faculty of Mathematics, Physics and Informatics	
Course ID: FMFI.KAMŠ/2-PMS-991/22	**Course title:** Diploma Thesis Defence
Number of credits: 15	
Educational level: II.	
Course requirements: Evaluated by the committee for the state examinations Approximate grade thresholds: A 90%, B 80%, C 70%, D 60%, E 50% Scale of assessment (preliminary/final): 0/100	
Learning outcomes: The outcome will be the defended master thesis.	
Class syllabus: Students present their results obtained in master thesis and answer questions given by the referee in his report. Finally, they discuss with members of the committee on the topic of the thesis.	
State exam syllabus:	
Recommended literature: Literature will be recommended by the supervisor of the thesis.	
Languages necessary to complete the course: Slovak, English	
Last change: 13.03.2022	
Approved by: doc. Mgr. Radoslav Harman, PhD.	

COURSE DESCRIPTION

Academic year: 2025/2026

University: Comenius University Bratislava

Faculty: Faculty of Mathematics, Physics and Informatics

Course ID:	**Course title:**
FMFI.KAMŠ/2-PMS-922/22	Diploma Thesis Seminar (1)

Educational activities:
Type of activities: seminar
Number of hours:
per week: 2 **per level/semester:** 26
Form of the course: on-site learning

Number of credits: 2

Recommended semester: 3.

Educational level: II.

Prerequisites:

Course requirements:
Preliminary semester evaluation: talks
Approximate grade thresholds: A 90%, B 80%, C 70%, D 60%, E 50%
Scale of assessment (preliminary/final): 100/0

Learning outcomes:
The students will extend their knowledge in selected areas related to the statistical topics included in the master study program. Moreover, the students will improve their presentation skills.

Class syllabus:
Talks on the topics extending the statistical methods included in the master study program, and the topics of students' diploma theses.

Recommended literature:
Anděl, J.: Statistické metody, Matfyzpress Praha 1998
Literature given in the information sheets of the obligatory courses of the study program

Languages necessary to complete the course:
Slovak, English

Notes:

Past grade distribution
Total number of evaluated students: 211

A	B	C	D	E	FX
93,84	4,74	1,42	0,0	0,0	0,0

Lecturers: doc. RNDr. Katarína Janková, CSc., doc. Mgr. Radoslav Harman, PhD.

Last change: 25.11.2021

Approved by: doc. Mgr. Radoslav Harman, PhD.

COURSE DESCRIPTION

Academic year: 2025/2026

University: Comenius University Bratislava

Faculty: Faculty of Mathematics, Physics and Informatics

Course ID:	**Course title:**
FMFI.KAMŠ/2-PMS-921/22	Diploma Thesis Seminar (2)

Educational activities:
Type of activities: seminar
Number of hours:
per week: 3 **per level/semester:** 39
Form of the course: on-site learning

Number of credits: 3

Recommended semester: 4.

Educational level: II.

Prerequisites:

Course requirements:
Evaluation based on: reports (teaching period)
Approximate grade thresholds: A 90%, B 80%, C 70%, D 60%, E 50%
Scale of assessment (preliminary/final): 100/0

Learning outcomes:
The students gained a deeper understanding of selected topics of mathematical statistics. The students have experience with individual and team presentation. The students know the basic tenets of scientific ethics and publication.

Class syllabus:
Reports of the students and the lecturer on selected topics of mathematical statistics. Rehearsal of the effective presentation. Discussion on the ethics of the scientific work and publication.

Recommended literature:
Hofman HA: Scientific Writing and Communication: Papers, Proposals, and Presentations 4th Edition, Oxford University Press 2019; General literature on statistics, according to the needs.

Languages necessary to complete the course:
Slovak, English

Notes:

Past grade distribution
Total number of evaluated students: 211

A	B	C	D	E	FX
98,1	0,47	1,42	0,0	0,0	0,0

Lecturers: doc. Mgr. Radoslav Harman, PhD., doc. RNDr. Katarína Janková, CSc.

Last change: 12.03.2022

Approved by: doc. Mgr. Radoslav Harman, PhD.

COURSE DESCRIPTION

Academic year: 2025/2026

University: Comenius University Bratislava

Faculty: Faculty of Mathematics, Physics and Informatics

Course ID:	**Course title:**
FMFI.KAI/2-MXX-130/21	Elements of AI

Educational activities:
Type of activities: independent work
Number of hours:
per week: 25 **per level/semester:** 325
Form of the course: on-site learning

Number of credits: 2

Recommended semester: 1., 7.

Educational level: II.

Prerequisites:

Course requirements:
Passing the online course https://course.elementsofai.com/ (in Enlish or Slovak version).

Learning outcomes:
The student will get acquainted with selected basic concepts of artificial intelligence and their use in solving various practical tasks.

Class syllabus:
1. What is artificial intelligence: related areas, AI philosophy.
2. Troubleshooting and UI: Browsing and troubleshooting, browsing and games
3. Probability and chance, Bayes' theorem, naive Bayesian classification.
4. Machine learning: nearest neighbor classifier, regression.
5. Neural networks: basics, creation, modern techniques.
6. Consequences: on predicting the future, the effects of AI on society, summary.

Recommended literature:
Russell S., Norwig P. (2010). Artificial Intelligence: A Modern Approach, (3rd ed.), Prentice Hall. Available in faculty library.
Marsland S. (2015). Machine Learning: An Algorithmic Perspective, (2nd ed.), CRC Press.

Languages necessary to complete the course:
Slovak or English

Notes:
The course consists of 20 numerical and 5 text-based tasks. Numerical tasks are checked automatically, text-based tasks are evaluated anonymously by students.

Past grade distribution
Total number of evaluated students: 95

A	B	C	D	E	FX
100,0	0,0	0,0	0,0	0,0	0,0

Lecturers: doc. RNDr. Mária Markošová, PhD.

Last change: 22.08.2021
Approved by: doc. Mgr. Radoslav Harman, PhD.

COURSE DESCRIPTION

Academic year: 2025/2026

University: Comenius University Bratislava

Faculty: Faculty of Mathematics, Physics and Informatics

Course ID:	**Course title:**
FMFI.KAI/2-MXX-130/21	Elements of AI

Educational activities:
Type of activities: independent work
Number of hours:
per week: 25 **per level/semester:** 325
Form of the course: on-site learning

Number of credits: 2

Recommended semester: 2., 8.

Educational level: II.

Prerequisites:

Course requirements:
Passing the online course https://course.elementsofai.com/ (in Enlish or Slovak version).

Learning outcomes:
The student will get acquainted with selected basic concepts of artificial intelligence and their use in solving various practical tasks.

Class syllabus:
1. What is artificial intelligence: related areas, AI philosophy.
2. Troubleshooting and UI: Browsing and troubleshooting, browsing and games
3. Probability and chance, Bayes' theorem, naive Bayesian classification.
4. Machine learning: nearest neighbor classifier, regression.
5. Neural networks: basics, creation, modern techniques.
6. Consequences: on predicting the future, the effects of AI on society, summary.

Recommended literature:
Russell S., Norwig P. (2010). Artificial Intelligence: A Modern Approach, (3rd ed.), Prentice Hall. Available in faculty library.
Marsland S. (2015). Machine Learning: An Algorithmic Perspective, (2nd ed.), CRC Press.

Languages necessary to complete the course:
Slovak or English

Notes:
The course consists of 20 numerical and 5 text-based tasks. Numerical tasks are checked automatically, text-based tasks are evaluated anonymously by students.

Past grade distribution
Total number of evaluated students: 95

A	B	C	D	E	FX
100,0	0,0	0,0	0,0	0,0	0,0

Lecturers: doc. RNDr. Mária Markošová, PhD.

Last change: 22.08.2021
Approved by: doc. Mgr. Radoslav Harman, PhD.

COURSE DESCRIPTION

Academic year: 2025/2026

University: Comenius University Bratislava

Faculty: Faculty of Mathematics, Physics and Informatics

Course ID:	**Course title:**
FMFI.KJP/1-MXX-233/13	English Conversation Course (1)

Educational activities:
Type of activities: practicals
Number of hours:
per week: 2 **per level/semester:** 26
Form of the course: on-site learning

Number of credits: 2

Recommended semester: 1., 3., 7., 9.

Educational level: I., I.II., II.

Prerequisites:

Course requirements:
tests, presentations, essays
Course prerequisites:
https://fmph.uniba.sk/microsites/kjp/katedra-jazykovej-pripravy/poziadavky-na-udelenie-priebezneho-hodnotenia-aj1aj2aj3-ostatne-kurzy/
Scale of assessment (preliminary/final): 100/0

Learning outcomes:
Continual improvement of all language skills focused on communication/speaking, listening comprehension and writing. The emphasis is on discourse, lexicology and morphology, word-bank broadening of communicational English as well as English for specific purposes appropriate for university students. This course is a follow up of the previously taught ESP course.

Class syllabus:
This course's focus is to broaden spoken/communicational English for students with B2/C1 level of English knowledge.

Recommended literature:
Appropriate study material is supplied based on the participants'level of English by the lecturer. (Sources- The Guardian, The Herald Morning Sun. The Nine News, The West Australian, BBC News and podcasts, CNN podcasts).

Languages necessary to complete the course:

Notes:

Past grade distribution
Total number of evaluated students: 291

A	B	C	D	E	FX
75,26	9,62	4,81	1,37	1,03	7,9

Lecturers: Mgr. Aneta Barnes

Last change: 11.04.2024
Approved by: doc. Mgr. Radoslav Harman, PhD.

COURSE DESCRIPTION

Academic year: 2025/2026

University: Comenius University Bratislava

Faculty: Faculty of Mathematics, Physics and Informatics

Course ID:	**Course title:**
FMFI.KJP/1-MXX-234/13	English Conversation Course (2)

Educational activities:
Type of activities: practicals
Number of hours:
per week: 2 **per level/semester:** 26
Form of the course: on-site learning

Number of credits: 2

Recommended semester: 2., 4., 8., 10.

Educational level: I., I.II., II.

Prerequisites:

Course requirements:
tests, oral presentations, essays
Course prerequisites:
https://fmph.uniba.sk/microsites/kjp/katedra-jazykovej-pripravy/poziadavky-na-udelenie-priebezneho-hodnotenia-aj1aj2aj3-ostatne-kurzy/
Scale of assessment (preliminary/final): 100/0

Learning outcomes:
Continual improvement of all language skills focused on communication/speaking, listening comprehension and writing. The emphasis is on discourse, lexicology and morphology, word-bank broadening of communicational/spoken English as well as English for specific purpose appropriate for university students. This course is a follow up of the Conversational English course 1.

Class syllabus:
This course's focus is to broaden spoken/communicational English for students with B2/C1 level of English knowledge(Upper-Intermediate/Lower Advanced).

Recommended literature:
Appropriate study material is supplied based on the participants'level of English by the lecturer. (Sources- The Guardian, The Herald Morning Sun. The Nine News, The West Australian, BBC News and podcasts, CNN podcasts).

Languages necessary to complete the course:

Notes:

Past grade distribution
Total number of evaluated students: 201

A	B	C	D	E	FX
82,09	8,96	2,49	1,0	0,0	5,47

Lecturers: Mgr. Aneta Barnes

Last change: 11.04.2024
Approved by: doc. Mgr. Radoslav Harman, PhD.

COURSE DESCRIPTION

Academic year: 2025/2026

University: Comenius University Bratislava

Faculty: Faculty of Mathematics, Physics and Informatics

Course ID:	**Course title:**
FMFI.KAMŠ/2-EFM-153/17	Finance and Insurance in Practice (1)

Educational activities:
Type of activities: seminar
Number of hours:
per week: 2 **per level/semester:** 26
Form of the course: on-site learning

Number of credits: 2

Recommended semester: 1., 3.

Educational level: II.

Prerequisites:

Course requirements:
During the semester the student can obtain 100% of points, for active participation in seminars (80%), solving tasks during seminars (20%), and possibly for additional individual practical work. Grade thresholds: A: 100.00% – 90.00%; B: 89.99% – 80.00%; C: 79.99% – 70.00%; D: 69.99% – 60.00%; E: 59.99% – 50.00%; Fx: 49.99% – 0.00%.
Scale of assessment (preliminary/final): Practical work during semester 100% / final exam 0%.

Learning outcomes:
After completing the course, the student will master the basics of work in the financial and insurance business. Student should also learn about the roles of the actuary, risk manager and financial analyst.

Class syllabus:
Basic financial and insurance segments. Banks and insurance companies - joint-stock companies and their legislative background.
The role of financial analysts, risk managers and actuaries in banks, insurance companies and in other financial institutions. International professional qualification of actuaries, stages in actuarial qualification, the career of an actuary. Profession of Actuary in Slovakia and globally.
Professional software used in financial and insurance practice.

Recommended literature:
Poisťovníctvo / Anna Majtánová a kolektív. Bratislava : Wolters Kluwer (Iura Edition), 2009;
Lecturer's notes and handouts.

Languages necessary to complete the course:
Slovak, English

Notes:

Past grade distribution
Total number of evaluated students: 70

A	B	C	D	E	FX
78,57	15,71	1,43	1,43	1,43	1,43

Lecturers: Mgr. Gábor Szűcs, PhD.
Last change: 16.06.2022
Approved by: doc. Mgr. Radoslav Harman, PhD.

COURSE DESCRIPTION

Academic year: 2025/2026

University: Comenius University Bratislava

Faculty: Faculty of Mathematics, Physics and Informatics

Course ID:	**Course title:**
FMFI.KAMŠ/2-EFM-154/17	Finance and Insurance in Practice (2)

Educational activities:
Type of activities: seminar
Number of hours:
per week: 2 **per level/semester:** 26
Form of the course: on-site learning

Number of credits: 2

Recommended semester: 2., 4.

Educational level: II.

Prerequisites:

Course requirements:
During the semester the student can obtain 100% of points, for active participation in seminars (80%), solving tasks during seminars (20%), and possibly for additional individual practical work. Grade thresholds: A: 100.00% – 90.00%; B: 89.99% – 80.00%; C: 79.99% – 70.00%; D: 69.99% – 60.00%; E: 59.99% – 50.00%; Fx: 49.99% – 0.00%.
Scale of assessment (preliminary/final): Practical work during semester 100% / final exam 0%.

Learning outcomes:
After completing the course, the student will master the basics of work in the financial and insurance business. Student should also learn about the roles of the actuary, risk manager and financial analyst.

Class syllabus:
Basic financial and insurance segments. Actuarial model development in life and non-life insurance. Financial modelling.
The role of financial analysts, risk managers and actuaries in banks, insurance companies and in other financial institutions. Professional requirements for financial analysts, risk managers and actuaries.
Professional software used in financial and insurance practice.

Recommended literature:
Poisťovníctvo / Anna Majtánová a kolektív. Bratislava : Wolters Kluwer (Iura Edition), 2009;
Lecturer's notes and handouts.

Languages necessary to complete the course:
Slovak, English

Notes:

Past grade distribution
Total number of evaluated students: 54

A	B	C	D	E	FX
75,93	11,11	9,26	1,85	0,0	1,85

Lecturers: Mgr. Gábor Szűcs, PhD.
Last change: 16.06.2022
Approved by: doc. Mgr. Radoslav Harman, PhD.

COURSE DESCRIPTION

Academic year: 2025/2026

University: Comenius University Bratislava

Faculty: Faculty of Mathematics, Physics and Informatics

Course ID:	**Course title:**
FMFI.KJP/1-MXX-141/00	French Language (1)

Educational activities:
Type of activities: practicals
Number of hours:
per week: 2 **per level/semester:** 26
Form of the course: on-site learning

Number of credits: 2

Recommended semester: 1., 7.

Educational level: I., I.II., II.

Prerequisites:

Course requirements:
Scale of assessment (preliminary/final): 100/0

Learning outcomes:

Class syllabus:
French language is taught at two levels: beginner and intermediate. Students opt for one of them depending on whether they wish to obtain the fundamentals of the language or wish to maintain and/or improve previous knowledge of French.

Recommended literature:
Capelle Guy, Menand Robert: Le Nouveau taxi 1, Hachette FLE Paris, France 2009, ISBN 978-2-01-155548 - 9

Languages necessary to complete the course:

Notes:

Past grade distribution
Total number of evaluated students: 482

A	B	C	D	E	FX
48,76	19,09	17,01	8,09	2,07	4,98

Lecturers: Mgr. Ľubomíra Kožehubová

Last change: 20.06.2022

Approved by: doc. Mgr. Radoslav Harman, PhD.

COURSE DESCRIPTION

Academic year: 2025/2026

University: Comenius University Bratislava

Faculty: Faculty of Mathematics, Physics and Informatics

Course ID:	**Course title:**
FMFI.KJP/1-MXX-142/00	French Language (2)

Educational activities:
Type of activities: practicals
Number of hours:
per week: 2 **per level/semester:** 26
Form of the course: on-site learning

Number of credits: 2

Recommended semester: 2., 8.

Educational level: I., I.II., II.

Prerequisites:

Course requirements:
Scale of assessment (preliminary/final): 100/0

Learning outcomes:

Class syllabus:
The subject continues the program of French language (1) and provides courses of essential and intermediate French language.

Recommended literature:
Capelle Guy, Menand Robert: Le Nouveau taxi 1, Hachette FLE Paris, France 2009, ISBN 978-2-01-155548 - 9

Languages necessary to complete the course:

Notes:

Past grade distribution
Total number of evaluated students: 307

A	B	C	D	E	FX
45,6	22,48	16,94	8,79	2,28	3,91

Lecturers: Mgr. Ľubomíra Kožehubová

Last change: 20.06.2022

Approved by: doc. Mgr. Radoslav Harman, PhD.

COURSE DESCRIPTION

Academic year: 2025/2026

University: Comenius University Bratislava

Faculty: Faculty of Mathematics, Physics and Informatics

Course ID:	**Course title:**
FMFI.KJP/1-MXX-241/00	French Language (3)

Educational activities:
Type of activities: practicals
Number of hours:
per week: 2 **per level/semester:** 26
Form of the course: on-site learning

Number of credits: 2

Recommended semester: 3., 9.

Educational level: I., I.II., II.

Prerequisites:

Course requirements:
Scale of assessment (preliminary/final): 100/0

Learning outcomes:

Class syllabus:
The subject provides a course of intermediate French language, covering not only general, but also technical language.

Recommended literature:
Capelle Guy, Menand Robert: Le Nouveau taxi 1, Hachette FLE Paris, France 2009, ISBN 978-2-01-155548 - 9

Languages necessary to complete the course:

Notes:

Past grade distribution
Total number of evaluated students: 120

A	B	C	D	E	FX
45,83	25,83	18,33	5,83	0,83	3,33

Lecturers: Mgr. Ľubomíra Kožehubová

Last change: 20.06.2022

Approved by: doc. Mgr. Radoslav Harman, PhD.

COURSE DESCRIPTION

Academic year: 2025/2026

University: Comenius University Bratislava

Faculty: Faculty of Mathematics, Physics and Informatics

Course ID:	**Course title:**
FMFI.KJP/1-MXX-242/00	French Language (4)

Educational activities:
Type of activities: practicals
Number of hours:
per week: 2 **per level/semester:** 26
Form of the course: on-site learning

Number of credits: 2

Recommended semester: 4., 10.

Educational level: I., I.II., II.

Prerequisites:

Course requirements:
Scale of assessment (preliminary/final): 100/0

Learning outcomes:

Class syllabus:
The subject provides a course of intermediate French covering not only general, but also technical French language.

Recommended literature:
Menand Robert: Le Nouveau taxi 2, Hachette FLE, Paris, France 2009, ISBN 978-2-01-155551 - 9

Languages necessary to complete the course:

Notes:

Past grade distribution
Total number of evaluated students: 79

A	B	C	D	E	FX
43,04	32,91	16,46	2,53	1,27	3,8

Lecturers: Mgr. Ľubomíra Kožehubová

Last change: 20.06.2022

Approved by: doc. Mgr. Radoslav Harman, PhD.

COURSE DESCRIPTION

Academic year: 2025/2026

University: Comenius University Bratislava

Faculty: Faculty of Mathematics, Physics and Informatics

Course ID:	**Course title:**
FMFI.KJP/1-MXX-151/00	German Language (1)

Educational activities:
Type of activities: practicals
Number of hours:
per week: 2 **per level/semester:** 26
Form of the course: on-site learning

Number of credits: 2

Recommended semester: 1., 7.

Educational level: I., I.II., II.

Prerequisites:

Course requirements:
Scale of assessment (preliminary/final): 100/0

Learning outcomes:
To master the fundamentals of the common language and basic technical terms of particular fields of study (depending on the student's level of German proficiency)

Class syllabus:
German language is taught at three levels: beginner, intermediate and advanced. Students opt for one of them depending on whether they need to learn the fundamentals or maintain and/or improve their previous knowledge.
This course's focus is to master the fundamentals of the common language and basic technical terms of particular fields of study (depending on the student's level of German proficiency)

Recommended literature:
Appropriate study material is supplied by teacher based on the participants'level of German proficiency.

Languages necessary to complete the course:

Notes:

Past grade distribution
Total number of evaluated students: 828

A	B	C	D	E	FX
37,56	25,48	18,6	9,18	2,78	6,4

Lecturers: Mgr. Alexandra Maďarová, Mgr. Simona Dobiašová, PhD.

Last change: 21.06.2022

Approved by: doc. Mgr. Radoslav Harman, PhD.

COURSE DESCRIPTION

Academic year: 2025/2026

University: Comenius University Bratislava

Faculty: Faculty of Mathematics, Physics and Informatics

Course ID:	**Course title:**
FMFI.KJP/1-MXX-152/00	German Language (2)

Educational activities:
Type of activities: practicals
Number of hours:
per week: 2 **per level/semester:** 26
Form of the course: on-site learning

Number of credits: 2

Recommended semester: 2., 8.

Educational level: I., I.II., II.

Prerequisites:

Course requirements:
Scale of assessment (preliminary/final): 100/0

Learning outcomes:
To master the fundamentals of the common language and basic technical terms of particular fields of study (depending on the student's level of German proficiency)

Class syllabus:
German language is taught at two levels: beginner and intermediate. Students opt for one of them depending on whether they wish to obtain the fundamentals of the language or wish to maintain and/or improve previous knowledge of German.
This course’s focus is to to master the fundamentals of the common language and basic technical terms of particular fields of study (depending on the student's level of German proficiency)

Recommended literature:
Appropriate study material is supplied by teacher based on the participants’level of German proficiency

Languages necessary to complete the course:

Notes:

Past grade distribution
Total number of evaluated students: 541

A	B	C	D	E	FX
37,89	19,59	19,59	12,38	3,51	7,02

Lecturers: Mgr. Alexandra Maďarová, Mgr. Simona Dobiašová, PhD.

Last change: 21.06.2022

Approved by: doc. Mgr. Radoslav Harman, PhD.

COURSE DESCRIPTION

Academic year: 2025/2026

University: Comenius University Bratislava

Faculty: Faculty of Mathematics, Physics and Informatics

Course ID:	**Course title:**
FMFI.KJP/1-MXX-251/00	German Language (3)

Educational activities:
Type of activities: practicals
Number of hours:
per week: 2 **per level/semester:** 26
Form of the course: on-site learning

Number of credits: 2

Recommended semester: 3., 9.

Educational level: I., I.II., II.

Prerequisites:

Course requirements:
Scale of assessment (preliminary/final): 100/0

Learning outcomes:
Master the basics of general language and basic professional terminology of individual fields of study (depending on the advanced level of students)

Class syllabus:
The course is a follow-up to the German language (1,2). The subject provides a course of intermediate or advanced German language.
This course's focus is to deepen the knowledge of the common language and basic technical terms of particular fields of study (depending on the student's level of German proficiency).

Recommended literature:
Appropriate study material is supplied by teacher based on the participants'level of German proficiency.

Languages necessary to complete the course:

Notes:

Past grade distribution
Total number of evaluated students: 184

A	B	C	D	E	FX
44,02	23,91	20,11	6,52	2,17	3,26

Lecturers: Mgr. Alexandra Maďarová, Mgr. Simona Dobiašová, PhD.

Last change: 21.06.2022

Approved by: doc. Mgr. Radoslav Harman, PhD.

COURSE DESCRIPTION

Academic year: 2025/2026

University: Comenius University Bratislava

Faculty: Faculty of Mathematics, Physics and Informatics

Course ID:	**Course title:**
FMFI.KJP/1-MXX-252/00	German Language (4)

Educational activities:
Type of activities: practicals
Number of hours:
per week: 2 **per level/semester:** 26
Form of the course: on-site learning

Number of credits: 2

Recommended semester: 4., 10.

Educational level: I., I.II., II.

Prerequisites:

Course requirements:
Scale of assessment (preliminary/final): 100/0

Learning outcomes:
Master the basics of general language and basic professional terminology of individual fields of study (depending on the advanced level of students)

Class syllabus:
The course is a follow-up to the German language (1-3). It provides a course of intermediate and advanced German language.
This course's focus is to deepen the knowledge of the common language and basic technical terms of particular fields of study (depending on the student's level of German proficiency).

Recommended literature:
Appropriate study material is supplied by teacher based on the participants'level of German proficiency.

Languages necessary to complete the course:

Notes:

Past grade distribution
Total number of evaluated students: 104

A	B	C	D	E	FX
44,23	22,12	14,42	10,58	3,85	4,81

Lecturers: Mgr. Alexandra Maďarová, Mgr. Simona Dobiašová, PhD.

Last change: 21.06.2022

Approved by: doc. Mgr. Radoslav Harman, PhD.

COURSE DESCRIPTION

Academic year: 2025/2026

University: Comenius University Bratislava

Faculty: Faculty of Mathematics, Physics and Informatics

Course ID:	**Course title:**
FMFI.KAMŠ/2-PMS-915/22	Individual Work on Diploma Thesis

Educational activities:
Type of activities: independent work
Number of hours:
per week: 25 **per level/semester:** 325
Form of the course: on-site learning

Number of credits: 5

Recommended semester: 3.

Educational level: II.

Prerequisites:

Course requirements:
Evaluation based on: assessment by the supervisor
Approximate grade thresholds: A 90%, B 80%, C 70%, D 60%, E 50%
Scale of assessment (preliminary/final): 100/0

Learning outcomes:
The master thesis will be prepared for the defense.

Class syllabus:
Individual study of the literature recommended by the supervisor of the thesis. Work on the problem stated by the supervisor, consultations with the supervisor. Writing down of the results of the thesis with respect to the given standards.

Recommended literature:
The literature is recommended by the supervisor.

Languages necessary to complete the course:
Slovak, English

Notes:

Past grade distribution
Total number of evaluated students: 92

A	B	C	D	E	FX
72,83	17,39	5,43	2,17	2,17	0,0

Lecturers:

Last change: 13.03.2022

Approved by: doc. Mgr. Radoslav Harman, PhD.

COURSE DESCRIPTION

Academic year: 2025/2026

University: Comenius University Bratislava

Faculty: Faculty of Mathematics, Physics and Informatics

Course ID:	**Course title:**
FMFI.KAMŠ/2-EFM-201/22	Insurance Theory

Educational activities:
Type of activities: lecture
Number of hours:
per week: 2 **per level/semester:** 26
Form of the course: on-site learning

Number of credits: 3

Recommended semester: 3.

Educational level: II.

Prerequisites:

Course requirements:
The course assessment is based only on the final written exam (with a weight of 100%), which has a possible (supplementary) oral part.
Grade thresholds: A: 100.00% – 90.00%; B: 89.99% – 80.00%; C: 79.99% – 70.00%; D: 69.99% – 60.00%; E: 59.99% – 50.00%; Fx: 49.99% – 0.00%.
Scale of assessment (preliminary/final): Practical work during semester 0% / final exam 100%.

Learning outcomes:
After completing the course, the student will master mathematical modeling techniques in life and non-life insurance. He or she will be able to solve typical problems, e.g. premium calculation, reserving and actuarial estimation. Student will also get acquainted with forms of deductible and reinsurance, credibility theory and methods of actuarial modeling.

Class syllabus:
Methods of mathematical modeling in life and non-life insurance, actuarial model construction techniques. Deductible, excess and franchise. Reinsurance: proportional and non-proportional forms of reinsurance. American credibility theory and Bayesian credibility theory. Estimation of reserves in non-life insurance, deterministic and stochastic run-off triangles. Unit Linked Insurance Plans (ULIP). Profit testing in insurance business: present value of future profits, profit margin, internal rate of return. Yield curves and their applications in insurance. Accounting standard IFRS 17 and its impact on the actuarial calculations.

Recommended literature:
Life Insurance Mathematics / Hans U. Gerber. Heidelberg : Springer, 1997, ISBN 978-3-662-03460-6;
Modely v životnom a neživotnom poistení / Rastislav Potocký. Bratislava : Statis, 2012;
Modern Actuarial Risk Theory Using R / Rob Kaas, Marc Goovaerts, Jan Dhaene, Michel Denuit. Second Edition, Heidelberg : Springer-Verlag, 2008;
Poistná matematika / Viera Sekerová, Mária Bilíková, Bratislava : Ekonóm, 2005;
Aplikovaná poistná štatistika / Viera Pacáková. Bratislava : Iura Edition, 2004;
study materials of the lecturer.

Languages necessary to complete the course:
Slovak, English

Notes:

Past grade distribution
Total number of evaluated students: 31

A	B	C	D	E	FX
74,19	3,23	16,13	3,23	3,23	0,0

Lecturers: Mgr. Gábor Szűcs, PhD., doc. Mgr. Igor Melicherčík, PhD.

Last change: 16.06.2022

Approved by: doc. Mgr. Radoslav Harman, PhD.

COURSE DESCRIPTION

Academic year: 2025/2026

University: Comenius University Bratislava

Faculty: Faculty of Mathematics, Physics and Informatics

Course ID:	**Course title:**
FMFI.KAMŠ/2-EFM-217/11	Insurance Theory Classes

Educational activities:
Type of activities: practicals
Number of hours:
per week: 2 **per level/semester:** 26
Form of the course: on-site learning

Number of credits: 2

Recommended semester: 3.

Educational level: II.

Prerequisites:

Recommended prerequisites:
2-EFM-201 Insurance Mathematics

Course requirements:
During the semester the student can get 100% points for one written test, which is usually written during the last two weeks of the semester.
Grade thresholds: A: 100.00% – 90.00%; B: 89.99% – 80.00%; C: 79.99% – 70.00%; D: 69.99% – 60.00%; E: 59.99% – 50.00%; Fx: 49.99% – 0.00%.
Scale of assessment (preliminary/final): Practical work during semester 100% / final exam 0%.

Learning outcomes:
After completing the course, the student will master mathematical modeling techniques in life and non-life insurance. He or she will be able to solve typical problems, e.g. premium calculation, reserving and actuarial estimation. Student will also get acquainted with forms of deductible and reinsurance, credibility theory and actuarial modeling methods.

Class syllabus:
Methods of mathematical modeling in life and non-life insurance, actuarial model construction techniques. Deductible, excess and franchise. Reinsurance: proportional and non-proportional forms of reinsurance. Bonus-malus schemes and No-Claim Discount (NCD) systems. American credibility theory and Bayesian credibility theory. Estimation of technical provisions in non-life insurance, deterministic run-off triangles: chain-ladder method, separation method and other methods. Unit Linked Insurance Plans (ULIP). Profit testing in insurance business: present value of future profits, profit margin, internal rate of return. Yield curves and their applications in insurance.

Recommended literature:
Life Insurance Mathematics / Hans U. Gerber. Heidelberg : Springer, 1997, ISBN 978-3-662-03460-6;
Modely v životnom a neživotnom poistení / Rastislav Potocký. Bratislava : Statis, 2012;
Modern Actuarial Risk Theory Using R / Rob Kaas, Marc Goovaerts, Jan Dhaene, Michel Denuit. Second Edition, Heidelberg : Springer-Verlag, 2008;
Aplikovaná poistná štatistika / Viera Pacáková. Bratislava : Iura Edition, 2004;

study materials of the lecturer.

Languages necessary to complete the course:
Slovak, English

Notes:

Past grade distribution
Total number of evaluated students: 154

A	B	C	D	E	FX
49,35	20,78	10,39	6,49	5,84	7,14

Lecturers: Mgr. Gábor Szűcs, PhD., Mgr. Lívia Rosová, PhD.

Last change: 16.06.2022

Approved by: doc. Mgr. Radoslav Harman, PhD.

COURSE DESCRIPTION

Academic year: 2025/2026

University: Comenius University Bratislava

Faculty: Faculty of Mathematics, Physics and Informatics

Course ID:	**Course title:**
FMFI.KDMFI+KAI/2-MXX-131/21	International Team-based Research Project

Educational activities:
Type of activities: course / independent work
Number of hours:
per week: 3 **per level/semester:** 39 / 30s
Form of the course: on-site learning

Number of credits: 5

Recommended semester: 1., 7.

Educational level: II.

Prerequisites:

Course requirements:
Continuous assessment: active participation in research in an international student team (25%), presentation of work in a workshop (25%), scientific article (50%)
Indicative evaluation scale: A 90 %, B 80 %, C 70 %, D 60 %, E 50 %
Scale of assessment (preliminary/final): 100/0

Learning outcomes:
Students will learn in the team to agree on a common research topic, formulate research questions, determine research methods for the problem, collect and evaluate data, discuss their findings, present research results to the professional public, analyze and evaluate the scientific work of their colleagues, prepare a scientific article suitable for publication

Class syllabus:
- Research methodology
- Design and implementation of a research project in an international group (preferably interdisciplinary)
- Methods and tools for collaboration in virtual space, collaboration in science and practice
- Academic writing, presentation of research results through scientific articles; objectives, content and structure of scientific articles; forms of academic publication, publication forums and evaluation of their quality
- Quality assurance and feedback - peer review
- Communication of results through posters or conference presentations

Recommended literature:
- Teachers' own electronic study materials published on the course website or in the Moodle system
- Gavora, Peter a kol. 2010. Elektronická učebnica pedagogického výskumu. [online]. Bratislava : Univerzita Komenského, 2010. Dostupné na: http://www.e-metodologia.fedu.uniba.sk/ ISBN 978–80–223–2951–4.

- Tharenou, P., Donohue, R. and Cooper, B., 2007. Management research methods. Cambridge University Press.
- Topping, A., 2015: The Quantitative-Qualitative Continium. In: Gerrish, K. and Lathlean, J., The Research Process in Nursing, p. 159-172
- Williamson, K. and Johanson, G. eds., 2017. Research methods: Information, systems, and contexts. Chandos Publishing.

Languages necessary to complete the course:
English

Notes:

Past grade distribution
Total number of evaluated students: 8

A	B	C	D	E	FX
75,0	0,0	0,0	0,0	25,0	0,0

Lecturers: doc. RNDr. Zuzana Kubincová, PhD., doc. RNDr. Martin Homola, PhD.

Last change: 22.06.2022

Approved by: doc. Mgr. Radoslav Harman, PhD.

COURSE DESCRIPTION

Academic year: 2025/2026

University: Comenius University Bratislava

Faculty: Faculty of Mathematics, Physics and Informatics

Course ID:	**Course title:**
FMFI.KAMŠ/2-PMS-118/22	Markov Models (1)

Educational activities:
Type of activities: lecture / practicals
Number of hours:
per week: 2 / 2 **per level/semester:** 26 / 26
Form of the course: on-site learning

Number of credits: 5

Recommended semester: 1.

Educational level: II.

Prerequisites:

Course requirements:
Preliminary semester evaluation: test(20%) and homeworks(50%)
Examination: written examination(30%)
Approximate grade thresholds: A 90%, B 80%, C 70%, D 60%, E 50%

Learning outcomes:
After completing the course the student will master elementary discrete time Markov chains models. He will be able to classify states of a Markov chain and calculate stationary probability distributions.

Class syllabus:
Markov property, transition probabilities, transition matrix, Chapman Kolmogorov equation, irreducibility of a chain. Classification of states, recurrent states, transient states, null recurrent states and positive recurrent states, periodicity. Existence of stationary distribution, ergodic distribution, necessary and sufficient conditions for ergodicity. Random walks, branching processes, absorbtion probabilities, mean time to absorbtion. Markov reward chains algorithms and Markov Chain Monte Carlo.

Recommended literature:
Kalas, J: Markovove reťazce, skriptá MFF UK
Norris, J.R.: Markov chains (1998)
Ross, S.M.: Introduction to probability models (2006)

Languages necessary to complete the course:

Notes:

Past grade distribution
Total number of evaluated students: 290

A	B	C	D	E	FX
23,45	22,07	25,86	19,66	7,93	1,03

Lecturers: doc. RNDr. Katarína Janková, CSc.

Last change: 22.06.2022
Approved by: doc. Mgr. Radoslav Harman, PhD.

COURSE DESCRIPTION

Academic year: 2025/2026

University: Comenius University Bratislava

Faculty: Faculty of Mathematics, Physics and Informatics

Course ID:	**Course title:**
FMFI.KAMŠ/2-PMS-119/22	Markov Models (2)

Educational activities:
Type of activities: lecture / practicals
Number of hours:
per week: 2 / 2 **per level/semester:** 26 / 26
Form of the course: on-site learning

Number of credits: 5

Recommended semester: 2.

Educational level: II.

Prerequisites:

Course requirements:
20% test(teaching period), 30% homeworks(teaching period), 50% examination
Approximate grade thresholds: A 90%, B 80%, C 70%, D 60%, E 50%

Learning outcomes:
After completing the course students will know properties of homogeneous Markov chains with continuous time. They will be able to use models based on these chains.

Class syllabus:
Markov property for continuous time chains, probabilities of transition, initial distribution, Chapman Kolmogorov equation. Forces of transition and their properties, backward and forward systems of Kolmogorov differential equations. Statioanary and ergodic distribution of the chain. Models of linear growth, birth and death chains, Poisson process. Characterization of processes using jump chain and holding times. Queueing systems: M/M/n, M/M/infinity. Imbedded chain technique for M/G/1. Pollaczek Chinchin formula.

Recommended literature:
Janková, K., Kilianová, S., Brunovský, P., Bokes, P.: Markovove reťazce a ich aplikácie. Epos 2014.
Norris, J.:Markov Chains.Cambridge University Press 1997.

Languages necessary to complete the course:

Notes:

Past grade distribution
Total number of evaluated students: 128

A	B	C	D	E	FX
28,13	15,63	25,78	23,44	5,47	1,56

Lecturers: doc. RNDr. Katarína Janková, CSc.

Last change: 22.06.2022

Approved by: doc. Mgr. Radoslav Harman, PhD.

COURSE DESCRIPTION

Academic year: 2025/2026

University: Comenius University Bratislava

Faculty: Faculty of Mathematics, Physics and Informatics

Course ID:	**Course title:**
FMFI.KAMŠ/2-EFM-236/15	Modelling Biological Processes

Educational activities:
Type of activities: lecture
Number of hours:
per week: 2 **per level/semester:** 26
Form of the course: on-site learning

Number of credits: 3

Recommended semester: 3.

Educational level: I.II., II.

Prerequisites:

Course requirements:
Continuous assessment: homework, exam during the semester
Exam: written and oral
Approximate grading scale: A 90%, B 80%, C 70%, D 60%, E 50%

Learning outcomes:
Passing this subject, students will gain a basic understanding and overview of methods in biological modeling.

Class syllabus:
Biological modeling with ordinary differential equations: the principle of mass balance, mass action rule, scaling and nondimensionalisation, one-component models (Michaelis-Menten kinetics, gene autoregulation), multi-component models (biological switches, oscillators, epidemiology). Modeling with differential equations with delay. Models with spatial component: the reaction-diffusion systems, the spread of epidemics, pattern formation. Stochastic models: probability balance equation, Gillespie simulation algorithm, stochastic models of gene expression.

Recommended literature:
Mathematical biology : 1. : An introduction / J. D. Murray. New York : Springer, 2002
Mathematical biology : 2. : Spatial models and biomedical applications / J. D. Murray. New York : Springer, 2003
Keener, J., Sneyd, J., Mathematical physiology: I. Cellular physiology, 2nd. ed., Springer, New York, 2008
Wilkinson, D., Stochastic modelling for systems biology, 2nd ed., Chapman & Hall/CRC, Boca Raton, 2012.

Languages necessary to complete the course:
Slovak, English

Notes:

Past grade distribution Total number of evaluated students: 84					
A	B	C	D	E	FX
41,67	20,24	17,86	13,1	4,76	2,38
Lecturers: doc. Mgr. Pavol Bokes, PhD.					
Last change: 19.10.2016					
Approved by: doc. Mgr. Radoslav Harman, PhD.					

COURSE DESCRIPTION

Academic year: 2025/2026

University: Comenius University Bratislava

Faculty: Faculty of Mathematics, Physics and Informatics

Course ID:	**Course title:**
FMFI.KAMŠ/2-PMS-115/10	Multivariate Statistical Analysis

Educational activities:
Type of activities: lecture / practicals
Number of hours:
per week: 2 / 2 **per level/semester:** 26 / 26
Form of the course: on-site learning

Number of credits: 5

Recommended semester: 1.

Educational level: II.

Prerequisites:

Course requirements:
Evaluation based on: test (teaching period, 60%), oral exam (40%)
Approximate grade thresholds: A 90%, B 80%, C 70%, D 60%, E 50%
Scale of assessment (preliminary/final): 60/40

Learning outcomes:
The students will have both theoretical and practical knowledge of the most used methods of multivariate statistical analyses.

Class syllabus:
Multivariate normal distribution and conditional distributions, Wishart distribution and Cochran theorem, Hotelling distribution, Wilks distribution, copulas, testing the hypotheses on parameters of the multivariate normal distribution, multivariate linear model, multivariate regression analysis, multivariate analysis of variance with one and two factors, covariance analysis, profile analysis, repeated measurements.

Recommended literature:
Härdle WK, Simar L: Applied multivariate statistical analysis, Springer, 2012; Härdle WK, Hlávka Z: Multivariate statistics: Exercises and solutions. Springer, 2007; Filová L, Szűcs G: Viacrozmerné štatistické analýzy, study materials of the lecturer, 2021.

Languages necessary to complete the course:
Slovak, English

Notes:

Past grade distribution
Total number of evaluated students: 392

A	B	C	D	E	FX
35,2	22,19	20,92	12,76	6,63	2,3

Lecturers: doc. Mgr. Lenka Filová, PhD.

Last change: 24.06.2022
Approved by: doc. Mgr. Radoslav Harman, PhD.

COURSE DESCRIPTION

Academic year: 2025/2026

University: Comenius University Bratislava

Faculty: Faculty of Mathematics, Physics and Informatics

Course ID:	**Course title:**
FMFI.KAMŠ/2-PMS-212/15	Nonparametric Statistics

Educational activities:
Type of activities: lecture
Number of hours:
per week: 2 **per level/semester:** 26
Form of the course: on-site learning

Number of credits: 3

Recommended semester: 4.

Educational level: II.

Prerequisites:

Course requirements:
written exam
Approximate grade thresholds: A 90%, B 80%, C 70%, D 60%, E 50%
Scale of assessment (preliminary/final): 0/100

Learning outcomes:
Students are able to apply basic nonparametric methods to real data. They also understand the principles and the mathematical background of these methods.

Class syllabus:
Sign test and a confidence interval for the true median. Wilcoxon signed rank test, Hodges-Lehmann estimator of location and the corresponding confidence interval. Sign test and Wilcoxon test for paired data. Wilcoxon rank sum test and Mann-Whitney test. Hodges-Lehmann estimator of shift and the corresponding confidence interval. Problem of ties. Kruskal-Wallis test and some post-hoc tests. Spearmans's rho, Kendall's tau. Theil's tests, estimators and confidence intervals concerning parameters of simple linear regression. Estimator's robustness to outliers (breakdown point). Kolmogorov-Smirnov tests. Cramér-von Mises test. Multimariate tests: component-wise sign test, Rayleigh test, Randles test by means of interdirections. Availability of the discussed methods in the software R.

Recommended literature:
Rublík F: Neparametrické metódy. Veda 2011;
Lehmann E: Nonparametrics: Statistical Methods Based on Ranks (revised edition). Springer 2006;
Hollander M, Wolfe D A, Chicken E: Nonparametric statistical methods 3rd ed. Wiley 2013;

Languages necessary to complete the course:
Slovak, English

Notes:

Past grade distribution Total number of evaluated students: 207					
A	B	C	D	E	FX
68,6	11,59	7,73	5,8	4,35	1,93
Lecturers: Mgr. Ján Somorčík, PhD., doc. Mgr. Lenka Filová, PhD.					
Last change: 11.03.2022					
Approved by: doc. Mgr. Radoslav Harman, PhD.					

COURSE DESCRIPTION

Academic year: 2025/2026

University: Comenius University Bratislava

Faculty: Faculty of Mathematics, Physics and Informatics

Course ID:	**Course title:**
FMFI.KAI/2-MXX-132/23	Participation in Empirical Research

Educational activities:
Type of activities: course
Number of hours:
per week: 2 **per level/semester:** 26
Form of the course: on-site learning

Number of credits: 2

Recommended semester: 1., 7.

Educational level: I., I.II., II.

Prerequisites:

Course requirements:

Learning outcomes:

Class syllabus:

Recommended literature:

Languages necessary to complete the course:

Notes:

Past grade distribution
Total number of evaluated students: 201

A	B	C	D	E	FX
89,55	1,49	1,49	0,0	2,99	4,48

Lecturers: Mgr. Xenia Daniela Poslon, PhD.

Last change: 06.09.2023

Approved by: doc. Mgr. Radoslav Harman, PhD.

COURSE DESCRIPTION

Academic year: 2025/2026

University: Comenius University Bratislava

Faculty: Faculty of Mathematics, Physics and Informatics

Course ID:	**Course title:**
FMFI.KAI/2-MXX-132/23	Participation in Empirical Research

Educational activities:
Type of activities: course
Number of hours:
per week: 2 **per level/semester:** 26
Form of the course: on-site learning

Number of credits: 2

Recommended semester: 2., 8.

Educational level: I., I.II., II.

Prerequisites:

Course requirements:

Learning outcomes:

Class syllabus:

Recommended literature:

Languages necessary to complete the course:

Notes:

Past grade distribution
Total number of evaluated students: 201

A	B	C	D	E	FX
89,55	1,49	1,49	0,0	2,99	4,48

Lecturers: Mgr. Xenia Daniela Poslon, PhD.

Last change: 06.09.2023

Approved by: doc. Mgr. Radoslav Harman, PhD.

COURSE DESCRIPTION

Academic year: 2025/2026

University: Comenius University Bratislava

Faculty: Faculty of Mathematics, Physics and Informatics

Course ID:	**Course title:**
FMFI.KAMŠ/2-PMS-135/00	Pensions and Pension Funds

Educational activities:
Type of activities: lecture
Number of hours:
per week: 2 **per level/semester:** 26
Form of the course: on-site learning

Number of credits: 3

Recommended semester: 2., 4.

Educational level: II.

Prerequisites:

Course requirements:
During the semester the student can get 50% of the assessment for one presentation. The final oral exam has a weight of 50%.
Grade thresholds: A: 100.00% – 90.00%; B: 89.99% – 80.00%; C: 79.99% – 70.00%; D: 69.99% – 60.00%; E: 59.99% – 50.00%; Fx: 49.99% – 0.00%.
Scale of assessment (preliminary/final): Practical work during semester 50% / final exam 50%.

Learning outcomes:
After completing the course, the student will know the basic principles and functions of pension schemes. He or she will get acquainted with the pension system of the Slovak Republic and old-age pension schemes of some other countries of the world. The student will be able to valuate assets and liabilities of various types of pension systems, such as defined benefit (DB) schemes and defined contribution (DC) schemes.

Class syllabus:
Three pillars of pension system: compulsory, supplementary, personal. Pension system in Slovakia. The pay-as-you-go system, funded pension scheme. Defined benefit (DB) plans and defined contribution (DC) plans. Benefits not depending on previous earnings, depending on average salary or last salaries. One-time lump sum death benefit. Transfers. Funding plans. Pension funds investment.

Recommended literature:
Penze: kvantitativní přístup / Tomáš Cipra, Praha : Ekopress, 2012;
Pensions at a Glance 2019 / OECD and G20 Indicators, Paris : OECD Publishing, 2019; https://doi.org/10.1787/b6d3dcfc-en;
An Introduction to Pension Schemes / E. M. Lee, London : Institute and Faculty of Actuaries, 1986;
study materials of lecturers.

Languages necessary to complete the course:
Slovak, English

Notes:

Past grade distribution
Total number of evaluated students: 84

A	B	C	D	E	FX
65,48	19,05	8,33	0,0	5,95	1,19

Lecturers: doc. Mgr. Igor Melicherčík, PhD., Mgr. Gábor Szűcs, PhD.

Last change: 20.06.2022

Approved by: doc. Mgr. Radoslav Harman, PhD.

COURSE DESCRIPTION

Academic year: 2025/2026

University: Comenius University Bratislava

Faculty: Faculty of Mathematics, Physics and Informatics

Course ID:	**Course title:**
FMFI.KTV/2-MXX-110/00	Physical Education and Sport (1)

Educational activities:
Type of activities: practicals
Number of hours:
per week: 2 **per level/semester:** 26
Form of the course: on-site learning

Number of credits: 2

Recommended semester: 1., 7.

Educational level: I.II., II.

Prerequisites:

Course requirements:
Scale of assessment (preliminary/final): 100/0

Learning outcomes:

Class syllabus:
Practicing of the students´ game skills in collective sports: basketball, volleyball, football, floorball and hockey. Mastering of the basic technique of a particular sport discipline in other sports. In paddling, basic training on still and slightly flowing water. Development of coordination skills, improvement of articular mobility and cardiovascular system.

Recommended literature:

Languages necessary to complete the course:
Slovak, English

Notes:

Past grade distribution
Total number of evaluated students: 1911

A	B	C	D	E	FX
97,65	0,63	0,05	0,0	0,0	1,67

Lecturers: PaedDr. Dana Mašlejová, Mgr. Ladislav Mókus, Mgr. Jana Leginusová, Mgr. Tomáš Kuchár, PhD., PaedDr. Mikuláš Ortutay, Mgr. Martin Dovičák, PhD., Mgr. Júlia Raábová, PhD., Mgr. Branislav Nedbálek, PhD., Mgr. Tomáš Lovecký

Last change: 15.03.2022

Approved by: doc. Mgr. Radoslav Harman, PhD.

COURSE DESCRIPTION

Academic year: 2025/2026

University: Comenius University Bratislava

Faculty: Faculty of Mathematics, Physics and Informatics

Course ID:	**Course title:**
FMFI.KTV/2-MXX-120/00	Physical Education and Sport (2)

Educational activities:
Type of activities: practicals
Number of hours:
per week: 2 **per level/semester:** 26
Form of the course: on-site learning

Number of credits: 2

Recommended semester: 2., 8.

Educational level: I.II., II.

Prerequisites:

Course requirements:
Scale of assessment (preliminary/final): 100/0

Learning outcomes:

Class syllabus:
Practicing of offensive and defensive game combinations and playing with modified rules in collective sports such as basketball, volleyball, football, floorball, hockey. Command of elements of higher difficulty in locomotion skills (swimming - crawl stroke, breast stroke, butterfly stroke, trampoline jumping and aerobics – practicing of areobics compositions, bodybuilding – development of the main muscle groups, paddling on running water. Testing of the level of physical fitness and coordination skills.

Recommended literature:

Languages necessary to complete the course:
Slovak, English

Notes:

Past grade distribution
Total number of evaluated students: 1797

A	B	C	D	E	FX
98,44	0,33	0,06	0,06	0,06	1,06

Lecturers: Mgr. Martin Dovičák, PhD., Mgr. Tomáš Kuchár, PhD., Mgr. Jana Leginusová, PaedDr. Dana Mašlejová, Mgr. Ladislav Mókus, Mgr. Branislav Nedbálek, PhD., PaedDr. Mikuláš Ortutay, Mgr. Júlia Raábová, PhD., Mgr. Tomáš Lovecký

Last change: 15.03.2022

Approved by: doc. Mgr. Radoslav Harman, PhD.

COURSE DESCRIPTION

Academic year: 2025/2026

University: Comenius University Bratislava

Faculty: Faculty of Mathematics, Physics and Informatics

Course ID:	**Course title:**
FMFI.KTV/2-MXX-210/00	Physical Education and Sport (3)

Educational activities:
Type of activities: practicals
Number of hours:
per week: 2 **per level/semester:** 26
Form of the course: on-site learning

Number of credits: 2

Recommended semester: 3., 9.

Educational level: I.II., II.

Prerequisites:

Course requirements:
Scale of assessment (preliminary/final): 100/0

Learning outcomes:

Class syllabus:
To improve offensive and defensive game combinations in collective sports. Practicing of tactical and technical elements in individual sports. Compensatory exercises to correct wrong body posture. Stretching. Competition rules in sport disciplines.

Recommended literature:

Languages necessary to complete the course:
Slovak, English

Notes:

Past grade distribution
Total number of evaluated students: 1454

A	B	C	D	E	FX
98,56	0,41	0,07	0,0	0,07	0,89

Lecturers: PaedDr. Dana Mašlejová, Mgr. Ladislav Mókus, Mgr. Jana Leginusová, Mgr. Tomáš Kuchár, PhD., PaedDr. Mikuláš Ortutay, Mgr. Martin Dovičák, PhD., Mgr. Júlia Raábová, PhD., Mgr. Branislav Nedbálek, PhD., Mgr. Tomáš Lovecký

Last change: 15.03.2022

Approved by: doc. Mgr. Radoslav Harman, PhD.

COURSE DESCRIPTION

Academic year: 2025/2026

University: Comenius University Bratislava

Faculty: Faculty of Mathematics, Physics and Informatics

Course ID:	**Course title:**
FMFI.KTV/2-MXX-220/00	Physical Education and Sport (4)

Educational activities:
Type of activities: practicals
Number of hours:
per week: 2 **per level/semester:** 26
Form of the course: on-site learning

Number of credits: 2

Recommended semester: 4., 10.

Educational level: I.II., II.

Prerequisites:

Course requirements:
Scale of assessment (preliminary/final): 100/0

Learning outcomes:

Class syllabus:
Sport training for Faculty Championships in a selected sport with modified rules. Selection of sport-talented students into teams of the Faculty Sport League, University League of Bratislava Faculties, and participation in sport events of the Faculty and University.

Recommended literature:

Languages necessary to complete the course:
Slovak, English

Notes:

Past grade distribution
Total number of evaluated students: 1267

A	B	C	D	E	FX
98,34	0,39	0,08	0,08	0,08	1,03

Lecturers: PaedDr. Dana Mašlejová, Mgr. Ladislav Mókus, Mgr. Jana Leginusová, Mgr. Tomáš Kuchár, PhD., PaedDr. Mikuláš Ortutay, Mgr. Martin Dovičák, PhD., Mgr. Branislav Nedbálek, PhD., Mgr. Júlia Raábová, PhD., Mgr. Tomáš Lovecký

Last change: 15.03.2022

Approved by: doc. Mgr. Radoslav Harman, PhD.

COURSE DESCRIPTION

Academic year: 2025/2026

University: Comenius University Bratislava

Faculty: Faculty of Mathematics, Physics and Informatics

Course ID:	**Course title:**
FMFI.KAMŠ/2-PMS-223/22	Probabilistic and Statistical Methods of Artificial Intelligence

Educational activities:
Type of activities: seminar
Number of hours:
per week: 2 **per level/semester:** 26
Form of the course: on-site learning

Number of credits: 2

Recommended semester: 3.

Educational level: II.

Prerequisites:

Course requirements:
Evaluation based on: active participation (teaching period)
Approximate grade thresholds: A 90%, B 80%, C 70%, D 60%, E 50%
Scale of assessment (preliminary/final): 100/0

Learning outcomes:
The students discuss selected advanced probabilistic and statistical methods utilized in the so-called artificial intelligence.

Class syllabus:
The topic of the seminar will be selected at the beginning of the semester. Possible topics include: Markov adaptive methods under uncertainty, Kalman filter, Graphical probabilistic models, General theory of statistical learning, Mixture models, EM algorithm, A very brief introduction to neural networks, Nonparametric regression (local regression, support vector regression, regression trees, MARS, generalized additive models, etc.), Fisher scoring algorithm

Recommended literature:
Hastie T, Tibshirani R, Friedman J: The Elements of Statistical Learning: Data Mining, Inference, and Prediction, Second Edition (Springer Series in Statistics) 2nd Edition, Springer 2016;
Russell S, Norvig P: Artificial Intelligence: A Modern Approach (Pearson Series in Artificial Intelligence) 4th Edition, Pearson, 2020

Languages necessary to complete the course:
Slovak, English

Notes:
Enrollment limit: 20 students

Past grade distribution
Total number of evaluated students: 17

A	B	C	D	E	FX
100,0	0,0	0,0	0,0	0,0	0,0

Lecturers: doc. Mgr. Radoslav Harman, PhD.
Last change: 13.03.2022
Approved by: doc. Mgr. Radoslav Harman, PhD.

COURSE DESCRIPTION

Academic year: 2025/2026

University: Comenius University Bratislava

Faculty: Faculty of Mathematics, Physics and Informatics

Course ID:	**Course title:**
FMFI.KAMŠ/2-PMS-141/15	Probability Theory

Educational activities:
Type of activities: lecture / practicals
Number of hours:
per week: 2 / 2 **per level/semester:** 26 / 26
Form of the course: on-site learning

Number of credits: 5

Recommended semester: 1.

Educational level: II.

Prerequisites:

Course requirements:
test (teaching period), written exam
Approximate grade thresholds: A 90%, B 80%, C 70%, D 60%, E 50%
Scale of assessment (preliminary/final): 40/60

Learning outcomes:
The student understands various advanced probabilistic concepts and statements based on the theory of measures and integration. He also comprehends the basic properties of martingales and knows about some of their applications.

Class syllabus:
1. How to understands the concepts of random event and random variable. Conditions of measurability of a mapping; applications of the Borel-Cantelli lema.
2. Basics of the signed measures theory: positive and negative sets, set of zero signed measure in the strong sense, Hahn decomposition, Jordan decomposition, absolute continuity, Radon-Nikodym theorem, application of the Radon-Nikodym derivative via the change of variable theorem.
3. Sigma-algebra as a representative of extra information, filtration; conditional expectation given by a sigma-algebra (geometric and probabilistic approach).
4. Martingale, supermartingale, submartingale; sigma-algebra generated by random variables; stopping time.
5. Some winning betting strategies in gambling (e.g. the martingale betting strategy); Doob's optional stopping theorem and its applications to gambling of one or more players, to random walks, and to evaluation of some expected stopping times in gambling.
6. Tower property of conditional expectations and a corollary; properties of martingale increments; ways to produce a martingale.
7. Applications of conditional expectations and martingales to insurance: model with random interests, valuation of the policy, technical financial and total loss of the insurer; extensions of the Hattendorff's theorem to the case of random interests and financial or technical losses.

Recommended literature:
Williams D: Probability with Martingales. Cambridge University Press 1991;

Melicherčík I: Kapitoly z finančnej matematiky. Epos 2006;
Bhattacharya R N, Waymire E C: Stochastic Processes with Applications. SIAM 2009;
Bühlmann H: Life Insurance with Stochastic Interest Rates. In: Ottaviani G (eds) Financial Risk in Insurance. Springer 2000.

Languages necessary to complete the course:
Slovak, English

Notes:

Past grade distribution
Total number of evaluated students: 122

A	B	C	D	E	FX
32,79	13,11	19,67	20,49	13,11	0,82

Lecturers: Mgr. Ján Somorčík, PhD., doc. RNDr. Katarína Janková, CSc.

Last change: 11.03.2022

Approved by: doc. Mgr. Radoslav Harman, PhD.

STATE EXAM DESCRIPTION

Academic year: 2025/2026	
University: Comenius University Bratislava	
Faculty: Faculty of Mathematics, Physics and Informatics	
Course ID: FMFI.KAMŠ/2-PMS-952/15	**Course title:** Probability and Mathematical Statistics
Number of credits: 6	
Educational level: II.	
Course requirements: Evaluation based on: Assessment by the committee for the state examinations Approximate grade thresholds: A 90%, B 80%, C 70%, D 60%, E 50% Scale of assessment (preliminary/final): 0/100	
Learning outcomes: The student passes the state exam.	
Class syllabus: The student draws questions from a given field of questions from profile courses. After a short preparation he answers the questions and additional questions of the members of the committee.	
State exam syllabus:	
Recommended literature: According to the announced topics of the state examinations	
Languages necessary to complete the course: Slovak, English	
Last change: 13.03.2022	
Approved by: doc. Mgr. Radoslav Harman, PhD.	

COURSE DESCRIPTION

Academic year: 2025/2026

University: Comenius University Bratislava

Faculty: Faculty of Mathematics, Physics and Informatics

Course ID:	**Course title:**
FMFI.KAMŠ/2-PMS-222/22	Programming in SAS

Educational activities:
Type of activities: course
Number of hours:
per week: 2 **per level/semester:** 26
Form of the course: on-site learning

Number of credits: 2

Recommended semester: 1., 3.

Educational level: II.

Prerequisites:

Antirequisites: FMFI.KAMŠ/2-PMS-222/15

Course requirements:
Preliminary semester evaluation: independent practice (80%), final exam (20%);
Approximate grade thresholds: A 91%, B 81%, C 71%, D 61%, E 51%
Scale of assessment (preliminary/final): 100/0

Learning outcomes:
Students will learn the basics of SAS programming language and will be able to access and process databases of various formats.

Class syllabus:
Basics of SAS language, creating SAS data from various sources (e.g. text files), data processing and reporting, data concatenation, data merging, numeric and text functions, identification of syntax and logic errors, basic SAS procedures.

Recommended literature:
SAS Institute Inc. 2001: Step-by-Step Programming with Base SAS® Software, Cary, NC: SAS Institute Inc.

Languages necessary to complete the course:
slovak, english

Notes:
Enrollment limit: 25 students

Past grade distribution
Total number of evaluated students: 60

A	B	C	D	E	FX
51,67	38,33	6,67	0,0	3,33	0,0

Lecturers: Mgr. Jozef Kováč, PhD.

Last change: 16.06.2022

Approved by: doc. Mgr. Radoslav Harman, PhD.

COURSE DESCRIPTION

Academic year: 2025/2026

University: Comenius University Bratislava

Faculty: Faculty of Mathematics, Physics and Informatics

Course ID:	**Course title:**
FMFI.KAMŠ/2-EFM-215/17	Quantitative Methods in Risk Management

Educational activities:
Type of activities: practicals / seminar
Number of hours:
per week: 1 / 2 **per level/semester:** 13 / 26
Form of the course: on-site learning

Number of credits: 4

Recommended semester: 2., 4.

Educational level: II.

Prerequisites:

Course requirements:

Learning outcomes:

Class syllabus:

Recommended literature:

Languages necessary to complete the course:

Notes:

Past grade distribution
Total number of evaluated students: 129

A	B	C	D	E	FX
39,53	28,68	16,28	9,3	2,33	3,88

Lecturers: Mgr. Ing. Pavol Jurča, PhD.

Last change:

Approved by: doc. Mgr. Radoslav Harman, PhD.

COURSE DESCRIPTION

Academic year: 2025/2026

University: Comenius University Bratislava

Faculty: Faculty of Mathematics, Physics and Informatics

Course ID:	**Course title:**
FMFI.KAMŠ/2-PMS-101/22	Random Processes

Educational activities:
Type of activities: lecture
Number of hours:
per week: 2 **per level/semester:** 26
Form of the course: on-site learning

Number of credits: 3

Recommended semester: 1.

Educational level: II.

Prerequisites:

Course requirements:
Preliminary semester evaluation: exam (20%), homework (40%);
Examination: test and oral examination (40%);
Approximate grade thresholds: A 90%, B 80%, C 70%, D 60%, E 50%
Scale of assessment (preliminary/final): 60/40

Learning outcomes:
Students will acquire knowledge of the basic theory of stochastic processes, spectral analysis and selected methods for analyzing and predicting real world processes.

Class syllabus:
probability distribution of stochastic process, expected value and covariance function of stochastic process, stationary stochastic process, spectral analysis, spectral density, its nonparametric and parametric estimation, time series decomposition, Holt-Winters method, time series regression.

Recommended literature:
Shumway R. H., Stoffer D.S.: Time Series Analysis and Its Applications With R Examples, New York: Springer 2011; Štulajter F.: Random processes and time series, Bratislava: Univerzita Komenského 2001; Hyndman R.J., Athanasopoulos, G.: Forecasting: principles and practice, 2nd edition, OTexts: Melbourne, Australia 2018

Languages necessary to complete the course:
Slovak, English

Notes:
Enrollment limit: 25 students

Past grade distribution
Total number of evaluated students: 226

A	B	C	D	E	FX
34,51	25,22	19,47	12,83	7,52	0,44

Lecturers: Mgr. Jozef Kováč, PhD., doc. RNDr. Beáta Stehlíková, PhD.

Last change: 22.06.2022
Approved by: doc. Mgr. Radoslav Harman, PhD.

COURSE DESCRIPTION

Academic year: 2025/2026

University: Comenius University Bratislava

Faculty: Faculty of Mathematics, Physics and Informatics

Course ID:	**Course title:**
FMFI.KAMŠ/2-PMS-107/15	Regression Models

Educational activities:
Type of activities: lecture / practicals
Number of hours:
per week: 2 / 2 **per level/semester:** 26 / 26
Form of the course: on-site learning

Number of credits: 5

Recommended semester: 1.

Educational level: II.

Prerequisites:

Course requirements:
Evaluation based on: test, project (teaching period), oral exam
Approximate grade thresholds: A 90%, B 80%, C 70%, D 60%, E 50%
Scale of assessment (preliminary/final): 50 (test 30 + project 20)/50

Learning outcomes:
The students will acquire understanding of linear, generalized linear and nonlinear regression models. They will also learn how to apply these models to practical problems.

Class syllabus:
1. Linear regression model – least squares estimator, rank-deficient model, Gauss-Markov theorem, confidence regions.
2. Generalized linear model – exponential class of distributions, link function, parameter estimation, hypothesis testing.
3. Nonlinear regression model – least squares estimator (LSE), properties of LSE and the computation of LSE, tests and confidence regions.

Recommended literature:
Pázman A, Lacko V: Prednášky z regresných modelov : Odhadovanie parametrov strednej hodnoty a štatistická optimalizácia experimentu, Univerzita Komenského, 2012;
Faraway J J: Extending the Linear Models with R: Generalized Linear, Mixed Effects and Nonparametric Regression Models, 2nd ed., Chapman & Hall/CRC, 2016

Languages necessary to complete the course:
Slovak, English

Notes:
Knowledge of linear regression is assumed, for instance at the level of Econometry 1-EFM-380.

Past grade distribution
Total number of evaluated students: 123

A	B	C	D	E	FX
30,08	21,95	20,33	17,89	8,94	0,81

Lecturers: Mgr. Samuel Rosa, PhD., doc. Mgr. Radoslav Harman, PhD.

Last change: 21.06.2022

Approved by: doc. Mgr. Radoslav Harman, PhD.

COURSE DESCRIPTION

Academic year: 2025/2026

University: Comenius University Bratislava

Faculty: Faculty of Mathematics, Physics and Informatics

Course ID:	**Course title:**
FMFI.KJP/1-MXX-161/00	Russian Language (1)

Educational activities:
Type of activities: practicals
Number of hours:
per week: 2 **per level/semester:** 26
Form of the course: on-site learning

Number of credits: 2

Recommended semester: 1., 7.

Educational level: I., I.II., II.

Prerequisites:

Course requirements:
Scale of assessment (preliminary/final): 100/0

Learning outcomes:
Basic communication in Russian, developing other Russian language skills - listening comprehension, reading and writing.

Class syllabus:
To master the fundamentals of general Russian. The language level is A1.
Learning the Cyrillic (Russian) alphabet, gaining basic language competence, building up skills and confidence in dealing with unfamiliar authentic and semi-authentic texts.
The subject provides a course in Russian language for beginners.

Recommended literature:
The textbook: : Точка Ру A1 (Ольга Долматова, Екатерина Новачац), pracovné karty Падежи 1 (Л.С. Безкоровайная, В.Е. Штыленко).

Languages necessary to complete the course:

Notes:

Past grade distribution
Total number of evaluated students: 738

A	B	C	D	E	FX
57,86	16,53	10,98	4,2	1,76	8,67

Lecturers: Viktoria Mirsalova

Last change: 20.06.2022

Approved by: doc. Mgr. Radoslav Harman, PhD.

COURSE DESCRIPTION

Academic year: 2025/2026

University: Comenius University Bratislava

Faculty: Faculty of Mathematics, Physics and Informatics

Course ID:	**Course title:**
FMFI.KJP/1-MXX-162/00	Russian Language (2)

Educational activities:
Type of activities: practicals
Number of hours:
per week: 2 **per level/semester:** 26
Form of the course: on-site learning

Number of credits: 2

Recommended semester: 2., 8.

Educational level: I., I.II., II.

Prerequisites:

Course requirements:
Scale of assessment (preliminary/final): 100/0

Learning outcomes:
Basic communication in Russian, developing other Russian language skills - listening comprehension, reading and writing.

Class syllabus:
To master the fundamentals of general Russian.
Learning the Cyrillic (Russian) alphabet, gaining basic language competence, building up skills and confidence in dealing with unfamiliar authentic and semi-authentic texts.
The subject continues the program of Russian language (1) and provides a course of Russian for beginners.

Recommended literature:
Textbook: Точка Ру A1 (Ольга Долматова, Екатерина Новачац), pracovné karty Падежи 1 (Л.С. Безкоровайная, В.Е. Штыленко).

Languages necessary to complete the course:

Notes:

Past grade distribution
Total number of evaluated students: 435

A	B	C	D	E	FX
63,91	16,09	8,97	3,91	0,92	6,21

Lecturers: Viktoria Mirsalova

Last change: 20.06.2022

Approved by: doc. Mgr. Radoslav Harman, PhD.

COURSE DESCRIPTION

Academic year: 2025/2026

University: Comenius University Bratislava

Faculty: Faculty of Mathematics, Physics and Informatics

Course ID:	**Course title:**
FMFI.KJP/1-MXX-261/00	Russian Language (3)

Educational activities:
Type of activities: practicals
Number of hours:
per week: 2 **per level/semester:** 26
Form of the course: on-site learning

Number of credits: 2

Recommended semester: 3., 9.

Educational level: I., I.II., II.

Prerequisites:

Course requirements:
Scale of assessment (preliminary/final): 100/0

Learning outcomes:
Basic communication in Russian, developing other Russian language skills - listening comprehension, reading and writing.

Class syllabus:
Learning the handwritten Russian (Russian Cursive Cyrillic), developing further language skills, gaining knowledge of Russian culture, history and way of life, pre-intermediate to intermediate grammar and vocabulary.
The course "Russian for Intermediate Students" is a follow-up to "Russian for Beginners". The subject of the course is general Russian in the range appropriate to the given level.

Recommended literature:
Точка Ру A2 (Ольга Долматова, Екатерина Новачац) a Short Stories in Russian (Olly Richards, Alex Rowlings)

Languages necessary to complete the course:

Notes:

Past grade distribution
Total number of evaluated students: 212

A	B	C	D	E	FX
69,34	17,92	8,96	2,36	0,0	1,42

Lecturers: Viktoria Mirsalova

Last change: 20.06.2022

Approved by: doc. Mgr. Radoslav Harman, PhD.

COURSE DESCRIPTION

Academic year: 2025/2026

University: Comenius University Bratislava

Faculty: Faculty of Mathematics, Physics and Informatics

Course ID:	**Course title:**
FMFI.KJP/1-MXX-262/00	Russian Language (4)

Educational activities:
Type of activities: practicals
Number of hours:
per week: 2 **per level/semester:** 26
Form of the course: on-site learning

Number of credits: 2

Recommended semester: 4., 10.

Educational level: I., I.II., II.

Prerequisites:

Course requirements:
Scale of assessment (preliminary/final): 100/0

Learning outcomes:
Learning the handwritten Russian (Russian Cursive Cyrillic), developing further language skills, gaining knowledge of Russian culture, history and way of life, pre-intermediate to intermediate grammar and vocabulary.

Class syllabus:
Learning the handwritten Russian (Russian Cursive Cyrillic), developing further language skills, gaining knowledge of Russian culture, history and way of life, pre-intermediate to intermediate grammar and vocabulary.
The course "Russian for Intermediate Students" is a follow-up to "Russian for Beginners". The subject of the course is general Russian in the range appropriate to the given level.

Recommended literature:
Точка Ру A2 (Ольга Долматова, Екатерина Новачац) a Short Stories in Russian (Olly Richards, Alex Rowlings)

Languages necessary to complete the course:

Notes:

Past grade distribution
Total number of evaluated students: 153

A	B	C	D	E	FX
74,51	14,38	7,19	2,61	0,65	0,65

Lecturers: Viktoria Mirsalova

Last change: 20.06.2022

Approved by: doc. Mgr. Radoslav Harman, PhD.

COURSE DESCRIPTION

Academic year: 2025/2026

University: Comenius University Bratislava

Faculty: Faculty of Mathematics, Physics and Informatics

Course ID:	**Course title:**
FMFI.KAMŠ/2-EFM-140/22	SQL Databases

Educational activities:
Type of activities: lecture / practicals
Number of hours:
per week: 2 / 2 **per level/semester:** 26 / 26
Form of the course: on-site learning

Number of credits: 5

Recommended semester: 3.

Educational level: I., I.II., II.

Prerequisites:

Course requirements:
Preliminary semester evaluation: active participation
Final examination: oral, semestral project
Approximate grade thresholds: A 90%, B 80%, C 70%, D 60%, E 50%
Scale of assessment (preliminary/final): Scale of assessment (preliminary/final): 20/80

Learning outcomes:
By completing the course, the student will gain the ability to work with databases, including database model design, creation in common SQL databases, and user interface programming in python, R, C ++, Matlab

Class syllabus:
Introduction to databases, database technologies, database models
Relational database model
SQL language
Relational databases
User rights in SQL
Database API
Interfaces for working with databases (web interface, CLI, GUI)
SQL programming (implementation in R, Matlab, Python, C ++)

Recommended literature:
Daniel Schneller, Udo Schwedt, MySQL Admin Cookbook, Packt Publishing Ltd. 2010
https://goalkicker.com/MySQLBook/MySQLNotesForProfessionals.pdf
Graeme Simsion, Graham Witt, Data Modeling Essentials, Elsevier 2004, ISBN: 9780080488677

Languages necessary to complete the course:
Slovak, English

Notes:

Past grade distribution Total number of evaluated students: 145					
A	B	C	D	E	FX
51,03	13,79	10,34	11,72	6,9	6,21
Lecturers: doc. Mgr. Róbert Breier, PhD., doc. RNDr. Tibor Ženiš, PhD.					
Last change: 20.06.2022					
Approved by: doc. Mgr. Radoslav Harman, PhD.					

COURSE DESCRIPTION

Academic year: 2025/2026

University: Comenius University Bratislava

Faculty: Faculty of Mathematics, Physics and Informatics

Course ID:	**Course title:**
FMFI.KAMŠ/2-EFM-143/17	Selected Actuarial Techniques

Educational activities:
Type of activities: seminar
Number of hours:
per week: 2 **per level/semester:** 26
Form of the course: on-site learning

Number of credits: 2

Recommended semester: 1., 3.

Educational level: II.

Prerequisites:

Course requirements:
During the semester the student can get 100% of points, for solving individual assignments (50%) and elaboration and submission of the semester project (50%).
Grade thresholds: A: 100.00% – 90.00%; B: 89.99% – 80.00%; C: 79.99% – 70.00%; D: 69.99% – 60.00%; E: 59.99% – 50.00%; Fx: 49.99% – 0.00%.
Scale of assessment (preliminary/final): Practical work during semester 100% / final exam 0%.

Learning outcomes:
After completing the course the student will master basic methods of work in life and non-life insurance in an international insurance company focusing on methods of cash-flow projection. He or she will be able to calculate actuarial and financial indicators.

Class syllabus:
Actuarial models in life insurance. Modelling the development of insurance contracts from the perspective of the client. Development of the number of insurance contracts with respect to the expected probability of death and lapse. Development of the mathematical reserves in the entire portfolio. Modelling of other variables affecting the profit of the insurance company. Modelling the future profits using the direct method. Modelling the future profits using the indirect method. Modelling of the present value of financial indicators. Impact of changes in assumptions on the profit of an insurance company.
Data preparation for modelling using the software R. Application of Generalized Linear Models (GLM) using the software R – selecting of appropriate parameters, presentation of results using R Shiny package.
Portfolio management in the insurance company using actuarial and financial indicators and relationships between them.

Recommended literature:
Modern Actuarial Risk Theory Using R / Rob Kaas, Marc Goovaerts, Jan Dhaene, Michel Denuit. Heidelberg : Springer, 2008, ISBN: 978-3-540-70998-5;
Jazyk R v aktuárskych analýzach / Michal Páleš. Bratislava : Vydavateľstvo EKONÓM, 2017, ISBN 978-80-225-4331-6;

Jazyk R pre aktuárov / Michal Páleš. Bratislava : Vydavateľstvo EKONÓM, 2019, ISBN 978-80-225-4331-6;
Zurich Insurance Company Ltd internal training materials.

Languages necessary to complete the course:
Slovak, English

Notes:
Limit: maximum 18 students.
It is recommended to have basic R-software skills. At the seminars, we present quantitative techniques used by actuaries and use real data sets from the area of life and non-life insurance.

Past grade distribution
Total number of evaluated students: 130

A	B	C	D	E	FX
65,38	13,08	8,46	10,0	2,31	0,77

Lecturers: Mgr. Matúš Džubák, Mgr. Gábor Szűcs, PhD.

Last change: 07.09.2023

Approved by: doc. Mgr. Radoslav Harman, PhD.

COURSE DESCRIPTION

Academic year: 2025/2026

University: Comenius University Bratislava

Faculty: Faculty of Mathematics, Physics and Informatics

Course ID:	**Course title:**
FMFI.KAMŠ/2-PMS-121/22	Sequential Statistical Methods

Educational activities:
Type of activities: lecture
Number of hours:
per week: 2 **per level/semester:** 26
Form of the course: on-site learning

Number of credits: 3

Recommended semester: 3.

Educational level: II.

Prerequisites:

Course requirements:
Preliminary semester evaluation: test(30%) and homeworks(30%)
Final examination: written examination(40%)
Approximate grade thresholds: A 90%, B 80%, C 70%, D 60%, E 50%

Learning outcomes:
Upon satisfactory completion of the course the student will be able to use sequential procedures for the statistical hypothesis testing and the estimation of unknown parameters.

Class syllabus:
Sequential hypothesis testing, sequential tests for quality control. Wald sequential test, its properties and characteristics. Wald's identities and their applications for operation characteristics and average sample number of a sequential test. Testing composite hypotheses, Sobel Wald test, comparison of parameters of two distributions. Sequential point estimation, Rao-Cramer theorem, Stein's two stage procedure. Sequential confidence intervals.

Recommended literature:
Hušková: Sekvenční analýza.
Rao: Lineární metody statistické indukce a jejich aplikace.
Govindarajulu, Z: Sequential statistics (2004)

Languages necessary to complete the course:

Notes:

Past grade distribution
Total number of evaluated students: 214

A	B	C	D	E	FX
34,58	24,77	22,43	13,08	4,67	0,47

Lecturers: doc. RNDr. Katarína Janková, CSc.

Last change: 22.06.2022

Approved by: doc. Mgr. Radoslav Harman, PhD.

COURSE DESCRIPTION

Academic year: 2025/2026

University: Comenius University Bratislava

Faculty: Faculty of Mathematics, Physics and Informatics

Course ID:	**Course title:**
FMFI.KJP/1-MXX-171/20	Slovak Language for Foreign Students (1)

Educational activities:
Type of activities: practicals
Number of hours:
per week: 2 **per level/semester:** 26
Form of the course: on-site learning

Number of credits: 2

Recommended semester: 1., 7.

Educational level: I., I.II., II., III.

Prerequisites:

Course requirements:
tests
Course prerequisites:
https://fmph.uniba.sk/microsites/kjp/katedra-jazykovej-pripravy/poziadavky-na-udelenie-priebezneho-hodnotenia-aj1aj2aj3-ostatne-kurzy/
Scale of assessment (preliminary/final): 100/0

Learning outcomes:
This course is aimed for foreign students to learn the fundamentals of the Slovak language with the focus on basic communication as well as all other language skills- listening comprehension,reading and writing.

Class syllabus:
The sylabus is targeted at the comprehension of the basics of the Slovak language for the absolute beginners (A1).

Recommended literature:
Krížom- Krážom Slovenčina 1, additional material to further support the covered topics.

Languages necessary to complete the course:

Notes:

Past grade distribution
Total number of evaluated students: 113

A	ABS	B	C	D	E	FX	NEABS
32,74	23,89	8,85	6,19	0,88	0,0	24,78	2,65

Lecturers: Mgr. Aneta Barnes

Last change: 21.06.2022

Approved by: doc. Mgr. Radoslav Harman, PhD.

COURSE DESCRIPTION

Academic year: 2025/2026

University: Comenius University Bratislava

Faculty: Faculty of Mathematics, Physics and Informatics

Course ID:	**Course title:**
FMFI.KJP/1-MXX-172/20	Slovak Language for Foreign Students (2)

Educational activities:
Type of activities: practicals
Number of hours:
per week: 2 **per level/semester:** 26
Form of the course: on-site learning

Number of credits: 2

Recommended semester: 2., 8.

Educational level: I., I.II., II., III.

Prerequisites:

Course requirements:
tests
Course prerequisites:
https://fmph.uniba.sk/microsites/kjp/katedra-jazykovej-pripravy/poziadavky-na-udelenie-priebezneho-hodnotenia-aj1aj2aj3-ostatne-kurzy/
Scale of assessment (preliminary/final): 100/0

Learning outcomes:
This course is aimed for foreign students to learn the fundamentals of the Slovak language with the focus on basic communication as well as all other language skills- listening comprehension,reading and writing.

Class syllabus:
The sylabus is targeted at the comprehension of the basics of the Slovak language for the absolute beginners (A1) and this course is a follow up course to the Slovak language course 1.

Recommended literature:
Krížom- Krážom Slovenčina 1, additional material to further support the covered topics

Languages necessary to complete the course:

Notes:

Past grade distribution
Total number of evaluated students: 86

A	ABS	B	C	D	E	FX	NEABS
62,79	18,6	1,16	1,16	0,0	0,0	9,3	6,98

Lecturers: Mgr. Aneta Barnes

Last change: 21.06.2022

Approved by: doc. Mgr. Radoslav Harman, PhD.

COURSE DESCRIPTION

Academic year: 2025/2026

University: Comenius University Bratislava

Faculty: Faculty of Mathematics, Physics and Informatics

Course ID:	**Course title:**
FMFI.KJP/1-MXX-271/20	Slovak Language for Foreign Students (3)

Educational activities:
Type of activities: practicals
Number of hours:
per week: 2 **per level/semester:** 26
Form of the course: on-site learning

Number of credits: 2

Recommended semester: 3., 9.

Educational level: I., I.II., II., III.

Prerequisites:

Course requirements:
tests
Course prerequisites:
https://fmph.uniba.sk/microsites/kjp/katedra-jazykovej-pripravy/poziadavky-na-udelenie-priebezneho-hodnotenia-aj1aj2aj3-ostatne-kurzy/
Scale of assessment (preliminary/final): 100/0

Learning outcomes:
This course is aimed for foreign students to better comprehend all the language skills important to enable correct usage of the Slovak language – listening comprehension, reading, writing and speaking.

Class syllabus:
The sylabus is targeted at the comprehension of all the language skills of the Slovak language , and it is a follow up course to the Slovak language course 2.

Recommended literature:
Krížom-Krážom Slovenčina 2, additional material to further support the covered topics.

Languages necessary to complete the course:

Notes:

Past grade distribution
Total number of evaluated students: 32

A	ABS	B	C	D	E	FX	NEABS
59,38	3,13	18,75	3,13	3,13	0,0	12,5	0,0

Lecturers: Mgr. Aneta Barnes

Last change: 21.06.2022

Approved by: doc. Mgr. Radoslav Harman, PhD.

COURSE DESCRIPTION

Academic year: 2025/2026

University: Comenius University Bratislava

Faculty: Faculty of Mathematics, Physics and Informatics

Course ID:	**Course title:**
FMFI.KJP/1-MXX-272/20	Slovak Language for Foreign Students (4)

Educational activities:
Type of activities: practicals
Number of hours:
per week: 2 **per level/semester:** 26
Form of the course: on-site learning

Number of credits: 2

Recommended semester: 4., 10.

Educational level: I., I.II., II., III.

Prerequisites:

Course requirements:
tests
Course prerequisites:
https://fmph.uniba.sk/microsites/kjp/katedra-jazykovej-pripravy/poziadavky-na-udelenie-priebezneho-hodnotenia-aj1aj2aj3-ostatne-kurzy/
Scale of assessment (preliminary/final): 100/0

Learning outcomes:
This course is aimed for foreign students to better comprehend all the language skills important to enable correct usage of the Slovak language – listening comprehension, reading, writing and speaking.

Class syllabus:
The sylabus is targeted at the comprehension of all the language skills of the Slovak language , and it is a follow up course to the Slovak language course 3.

Recommended literature:
Krížom-Krážom Slovenčina 2, additional material to further support the covered topics.

Languages necessary to complete the course:

Notes:

Past grade distribution
Total number of evaluated students: 25

A	ABS	B	C	D	E	FX	NEABS
84,0	0,0	4,0	4,0	0,0	0,0	8,0	0,0

Lecturers: Mgr. Aneta Barnes

Last change: 21.06.2022

Approved by: doc. Mgr. Radoslav Harman, PhD.

COURSE DESCRIPTION

Academic year: 2025/2026

University: Comenius University Bratislava

Faculty: Faculty of Mathematics, Physics and Informatics

Course ID:	**Course title:**
FMFI.KAMŠ/2-EFM-155/22	Social Network Analysis

Educational activities:
Type of activities: course
Number of hours:
per week: 2 **per level/semester:** 26
Form of the course: on-site learning

Number of credits: 2

Recommended semester: 4.

Educational level: II.

Prerequisites:

Recommended prerequisites:
Basics of R language

Antirequisites: FMFI.KAMŠ/2-EFM-155/18

Course requirements:
Assessment during the term: homework (20%), project (80%).
Grading: A: 90 and more, B: [80, 90), C: [70, 80), D: [60, 70), E: [50, 60), FX: less than 50
Scale of assessment (preliminary/final): 100/0

Learning outcomes:
Students gain an overview of different methods used in analysis of social networks. They will be able to apply them to real data using R software.

Class syllabus:
Basic notions of graph theory, examples of graphs/networks, their visualization. Node centralities - classical centralities (degree, closeness, betweenness, eigenvector centrality), selected new centrality measures, applications. Detection of communities in networks - concept of modularity, modularity optimization, selected other methods, applications. Networks based on correlations between time series. Random networks and their basic properties.

Recommended literature:
KOLACZYK, Eric D.; CSÁRDI, Gábor. Statistical analysis of network data with R. New York: Springer, 2014.
LUKE, Douglas A. A user's guide to network analysis in R. London, England: Springer, 2015.
Journal papers.

Languages necessary to complete the course:
Slovak, English

Notes:

Past grade distribution Total number of evaluated students: 38					
A	B	C	D	E	FX
78,95	2,63	13,16	5,26	0,0	0,0
Lecturers: doc. RNDr. Beáta Stehlíková, PhD.					
Last change: 17.06.2022					
Approved by: doc. Mgr. Radoslav Harman, PhD.					

COURSE DESCRIPTION

Academic year: 2025/2026

University: Comenius University Bratislava

Faculty: Faculty of Mathematics, Physics and Informatics

Course ID:	**Course title:**
FMFI.KTV/2-MXX-115/17	Sports in Natur (1)

Educational activities:
Type of activities:
Number of hours:
per week: **per level/semester:**
Form of the course: on-site learning

Number of credits: 2

Recommended semester: 1., 7.

Educational level: I.II., II.

Prerequisites:

Course requirements:
Grades: A 90%, B 80%, C 70%, D 60%, E 50%
The condition for the award of 1 or 2 credits is the completion of a multi-day course in its full scope, or the completion of one-day courses in the scope of 4 days. Candidates can apply to the leaders of individual courses. From the presented offer of courses, you can choose the one that suits your interests, abilities and deadlines.

Learning outcomes:
Acquisition and development of basic motor skills and abilities in selected sports: skiing and snowboarding. Mastering the correct technique of performing individual movements, which are necessary for skiing and snowboarding.

Class syllabus:
The student can sign up for the outdoor sports courses offered by the department: skiing, snowboarding. The lessons in the courses are focused on the development of basic and special movement skills and mastering the techniques needed for the sports.

Recommended literature:

Languages necessary to complete the course:
Slovak

Notes:
KTVŠ does not rent ski equipment.

Past grade distribution
Total number of evaluated students: 160

A	B	C	D	E	FX
98,75	0,0	0,0	0,0	0,0	1,25

Lecturers: Mgr. Martin Dovičák, PhD., Mgr. Tomáš Kuchár, PhD., Mgr. Jana Leginusová, PaedDr. Dana Mašlejová, Mgr. Ladislav Mókus, PaedDr. Mikuláš Ortutay, Mgr. Júlia Raábová, PhD., Mgr. Tomáš Lovecký

Last change: 16.06.2022
Approved by: doc. Mgr. Radoslav Harman, PhD.

COURSE DESCRIPTION

Academic year: 2025/2026

University: Comenius University Bratislava

Faculty: Faculty of Mathematics, Physics and Informatics

Course ID:	**Course title:**
FMFI.KTV/2-MXX-116/18	Sports in Natur (2)

Educational activities:
Type of activities:
Number of hours:
per week: **per level/semester:**
Form of the course: on-site learning

Number of credits: 2

Recommended semester: 2., 8.

Educational level: I.II., II.

Prerequisites:

Course requirements:
Grades: A 90%, B 80%, C 70%, D 60%, E 50%.
The condition for the award of 1 or 2 credits is the completion of a multi-day course in its full scope, or the completion of one-day courses in the scope of 4 days. Candidates can apply to the leaders of individual courses. From the presented offer of courses, you can choose the one that suits your interests, abilities and deadlines.

Learning outcomes:
Creating a positive and lasting relationship with physical activity. Acquisition and mastery of basic motor skills and abilities in outdoor sports: windsurfing, beach volleyball, water tourism - river rafting, hiking and other sports according to interest. Training and improving the technique needed for the sports.

Class syllabus:
The student can sign up for the outdoor sports courses offered by the department: water tourism - river rafting, windsurfing, beach volleyball, hiking and other hobby sports. The lessons in the courses are focused on the development of basic and special movement skills and, mastering the techniques needed for the sports.

Recommended literature:

Languages necessary to complete the course:
Slovak

Notes:
KTVŠ will provide sports equipment.

Past grade distribution
Total number of evaluated students: 109

A	B	C	D	E	FX
95,41	0,0	0,0	0,0	0,0	4,59

Lecturers: Mgr. Martin Dovičák, PhD., Mgr. Tomáš Kuchár, PhD., Mgr. Jana Leginusová, PaedDr. Dana Mašlejová, Mgr. Ladislav Mókus, PaedDr. Mikuláš Ortutay, Mgr. Júlia Raábová, PhD., Mgr. Tomáš Lovecký
Last change: 16.06.2022
Approved by: doc. Mgr. Radoslav Harman, PhD.

COURSE DESCRIPTION

Academic year: 2025/2026

University: Comenius University Bratislava

Faculty: Faculty of Mathematics, Physics and Informatics

Course ID:	**Course title:**
FMFI.KAMŠ/2-PMS-225/23	Statistical Data Quality

Educational activities:
Type of activities: seminar
Number of hours:
per week: 2 **per level/semester:** 26
Form of the course: on-site learning

Type, volume, methods and workload of the student - additional information
Type of teaching: seminar
Number of hours per week: 2
Number of hours per level/semester: 28
Form of the course: on-site learning

Number of credits: 2

Recommended semester: 4.

Educational level: II.

Prerequisites:

Course requirements:
Evaluation based on: talks and reports of students
Approximate grade thresholds: A 90%, B 80%, C 70%, D 60%, E 50%
Scale of assessment (preliminary/final): 100/0

Learning outcomes:
Students can understand and apply basic methods control, correction and maintaining of statistical data quality. They also understand the principles and the mathematical background of these methods.

Class syllabus:
Selection of topics: Missing data (removal and imputation of data), Imbalanced data (reduction and augmentation of data), Reproducibility and replicability of research, Pre-registration of studies, Data consistency, validation and verification, Data quality metrics, Metadata and informative data description, Data archiving

Recommended literature:
Moses B, Gavish L, Vorwerck M: Data Quality Fundamentals: A Practitioner's Guide to Building Trustworthy Data Pipelines, O'Reilly Media, 2022; Enders CK: Applied Missing Data Analysis, The Guildford Press, 2022; The National Academics (collective report): Reproducibility and Replicability in Science, National Academics Press 2019

Languages necessary to complete the course:
Slovak, English

Notes:

Past grade distribution Total number of evaluated students: 10					
A	B	C	D	E	FX
100,0	0,0	0,0	0,0	0,0	0,0
Lecturers: doc. Mgr. Lenka Filová, PhD., doc. Mgr. Radoslav Harman, PhD.					
Last change: 16.05.2023					
Approved by: doc. Mgr. Radoslav Harman, PhD.					

COURSE DESCRIPTION

Academic year: 2025/2026

University: Comenius University Bratislava

Faculty: Faculty of Mathematics, Physics and Informatics

Course ID:	**Course title:**
FMFI.KAMŠ/2-PMS-221/22	Statistical methods in clinical trials

Educational activities:
Type of activities: lecture
Number of hours:
per week: 2 **per level/semester:** 26
Form of the course: on-site learning

Number of credits: 2

Recommended semester: 1., 3.

Educational level: II.

Prerequisites:

Antirequisites: FMFI.KAMŠ/2-PMS-221/14

Course requirements:
Evaluation based on: project (teaching period)
Approximate grade thresholds: A 90%, B 80%, C 70%, D 60%, E 50%
Scale of assessment (preliminary/final): 100/0

Learning outcomes:
The students will gain knowledge about statistical methods used in the design of clinical trials.

Class syllabus:
Phases and aims of clinical trials, blinding, randomization, maximum tolerated dose, minimum effective dose. Designs in phase 1 of clinical trials: 3+3 design, group design for determining toxicity, continual reassessment method. Designs for phase 2 of clinical trials: two-stage designs, dose-response modeling, estimating target doses, multiple comparisons method. Designs for phase 3 of clinical trials: group sequential methods, adaptive designs. Determining the optimal sample size. Late onset toxicity trials.

Recommended literature:
O'Quigley J., Iasonos A., Bornkamp B. (Eds.): Handbook of methods for designing, monitoring, and analyzing dose-finding trials. CRC Press (2017); Filová L: Statistical methods in clinical trials, lecture notes (2021)

Languages necessary to complete the course:
Slovak, English

Notes:
Enrollment limit: 20 students

Past grade distribution
Total number of evaluated students: 15

A	B	C	D	E	FX
100,0	0,0	0,0	0,0	0,0	0,0

Lecturers: doc. Mgr. Lenka Filová, PhD.
Last change: 16.06.2022
Approved by: doc. Mgr. Radoslav Harman, PhD.

COURSE DESCRIPTION

Academic year: 2025/2026

University: Comenius University Bratislava

Faculty: Faculty of Mathematics, Physics and Informatics

Course ID:	**Course title:**
FMFI.KAMŠ/2-PMS-129/22	Stochastic Optimization Methods

Educational activities:
Type of activities: lecture
Number of hours:
per week: 2 **per level/semester:** 26
Form of the course: on-site learning

Number of credits: 2

Recommended semester: 1., 3.

Educational level: I., II.

Prerequisites:

Course requirements:
Evaluation based on: project (teaching period)
Approximate grade thresholds: A 90%, B 80%, C 70%, D 60%, E 50%
Scale of assessment (preliminary/final): 100/0

Learning outcomes:
The students understand the algorithmic principles of a variety of optimization methods, mostly heuristics with stochastic elements, applicable to the problems of discrete optimization as well as non-convex continuous optimization.

Class syllabus:
A brief general overview of optimization. Various types of optimization problems and optimization algorithms. Construction of the initial solution. The basic heuristic optimization algorithms. Covariance matrix adaptation. Simulated annealing. Algorithm Nelder-Mead. Genetic algorithms. Differential evolution. Particle swarm optimization. Basic principles of constrained optimization.

Recommended literature:
Luke S: Essentials of Metaheuristics, Lulu, 2013; Study materials of the lecturer.

Languages necessary to complete the course:
Slovak, English

Notes:

Past grade distribution
Total number of evaluated students: 219

A	B	C	D	E	FX
68,95	16,44	7,31	3,65	1,37	2,28

Lecturers: doc. Mgr. Radoslav Harman, PhD.

Last change: 10.03.2022

Approved by: doc. Mgr. Radoslav Harman, PhD.

COURSE DESCRIPTION

Academic year: 2025/2026

University: Comenius University Bratislava

Faculty: Faculty of Mathematics, Physics and Informatics

Course ID:	**Course title:**
FMFI.KAMŠ/2-PMS-123/10	Stochastic Simulation Methods

Educational activities:
Type of activities: lecture
Number of hours:
per week: 2 **per level/semester:** 26
Form of the course: on-site learning

Number of credits: 3

Recommended semester: 3.

Educational level: II.

Prerequisites:

Course requirements:
Evaluation based on: project (teaching period), oral exam
Approximate grade thresholds: A 90%, B 80%, C 70%, D 60%, E 50%
Scale of assessment (preliminary/final): 50/50

Learning outcomes:
The students understand the basic methods of computer sampling of random variables and vectors, apply them to the computation of Monte Carlo estimates and use them for the simulation of complex stochastic systems.

Class syllabus:
Generating random numbers, testing of random number generators, Sampling discrete random variables and vectors, Sampling continuous random variables and vectors, Statistical analysis of simulated data, Classical Monte Carlo methods.

Recommended literature:
Ross S: Simulation, Elsevier Academic Press 2006; Study materials of the lecturer.

Languages necessary to complete the course:
Slovak, English

Notes:
Enrollment limit: 40 students

Past grade distribution
Total number of evaluated students: 470

A	B	C	D	E	FX
41,91	25,32	13,83	8,94	6,17	3,83

Lecturers: doc. Mgr. Pavol Bokes, PhD.

Last change: 10.03.2022

Approved by: doc. Mgr. Radoslav Harman, PhD.

COURSE DESCRIPTION

Academic year: 2025/2026

University: Comenius University Bratislava

Faculty: Faculty of Mathematics, Physics and Informatics

Course ID:	**Course title:**
FMFI.KAMŠ/2-PMS-131/22	Survival Analysis

Educational activities:
Type of activities: lecture
Number of hours:
per week: 2 **per level/semester:** 26
Form of the course: on-site learning

Number of credits: 2

Recommended semester: 1., 3.

Educational level: II.

Prerequisites:

Antirequisites: FMFI.KAMŠ/2-PMS-131/17

Course requirements:
Evaluation based on: project (teaching period)
Approximate grade thresholds: A 90%, B 80%, C 70%, D 60%, E 50%
Scale of assessment (preliminary/final): 100/0

Learning outcomes:
The students will gain knowledge about selected statistical methods used in analysis and modelling of censored data, mainly in medical applications.

Class syllabus:
Censoring, survival function and hazard function. Discrete time models. Nonparametric estimates. Kaplan-Meier estimate. Comparing two survival datasets. Log-rank test. Wilcoxon test. Proportional hazards model. Likelihood function for proportional hazards model parameters. Weibull model as a proportional hazards model. Log-linear form of the Weibull distribution. More distributions used in survival analysis. Diagnostics in proportional hazards model. Cox-Snell residuals. Martingale residuals. Aft (accelerated failure time) models. Cox regression model. Models with time-dependent explanatory variables.

Recommended literature:
Collett, David. Modelling survival data in medical research. CRC press, 2015.
Kleinbaum, David G., and Mitchel Klein. Survival analysis. Springer,, 2010.

Languages necessary to complete the course:
Slovak, English

Notes:

Past grade distribution
Total number of evaluated students: 29

A	B	C	D	E	FX
89,66	0,0	6,9	0,0	0,0	3,45

Lecturers: doc. Mgr. Lenka Filová, PhD.
Last change: 16.06.2022
Approved by: doc. Mgr. Radoslav Harman, PhD.

COURSE DESCRIPTION

Academic year: 2025/2026

University: Comenius University Bratislava

Faculty: Faculty of Mathematics, Physics and Informatics

Course ID:	**Course title:**
FMFI.KAMŠ/2-PMS-102/22	Time Series

Educational activities:
Type of activities: course
Number of hours:
per week: 3 **per level/semester:** 39
Form of the course: on-site learning

Number of credits: 3

Recommended semester: 1.

Educational level: II.

Prerequisites:

Recommended prerequisites:
Basics of statistics (linear regression, analysis of residuals, testing hypotheses) and use of R language, complex numbers

Antirequisites: FMFI.KAMŠ/2-EFM-102/15 and FMFI.KAMS/2-INF-192/22 and FMFI.KAMŠ/2-INF-191/22

Course requirements:
Evaluation based on: homework (100%).
Grading: A: 90 and more, B: [80, 90), C: [70, 80), D: [60, 70), E: [50, 60), FX: less than 50
The weights of assessment (teaching period / examination period): 100/0
Scale of assessment (preliminary/final): 100/0

Learning outcomes:
Students get familiar with Box-Jenkins methodology of time series modeling using ARIMA processes. They will know theoretical properties of these models and will be able to use them to analyze real data.

Class syllabus:
Stationarity of time series. White noise. Wold representation. Autocorrelation function. Testing white noise, Ljung-Boxing Q-statistics. Autoregressive models (AR), moving average models (MA), ARMA models. Stationarity and invertibility conditions. Calculation of expected value, dispersion and covariances. Autocorrelation and partial autocorrelation function and their use in identification of the model. Differentiation of time series, integrated processes. Unit root testing. ADF test. Seasonality, SARIMA models.

Recommended literature:
Introduction to modern time series analysis / Gebhard Kirchgässner, Jürgen Wolters. Berlin : Springer, 2008;
Time series analysis and its applications : with R examples / Robert H. Shumway, David S. Stoffer. New York : Springer, 2011.

Languages necessary to complete the course:

Slovak, English

Notes:

Past grade distribution
Total number of evaluated students: 228

A	B	C	D	E	FX
35,53	23,25	18,86	14,91	6,14	1,32

Lecturers: doc. RNDr. Beáta Stehlíková, PhD., Mgr. Anna Hlubinová

Last change: 24.08.2023

Approved by: doc. Mgr. Radoslav Harman, PhD.