Course descriptions

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COURSE DESCRIPTION

Academic year: 2024/2025

University: Comenius University Bratislava

Faculty: Faculty of Mathematics, Physics and Informatics

Course ID:	**Course title:**
FMFI.KAI/1-DAV-212/22	Advanced methods for analysis and visualization of data in practice

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: 6.

Educational level: I.

Prerequisites:

Course requirements:
Continuing evaluation: homework assignments (50%), project (50%)
Indicative rating scale: A 90%, B 80%, C 70%, D 60%, E 50%

Learning outcomes:
Students will be able to analyze datasets of different sizes, pre-process them into a visualizable form as well as identify and practically apply different methods of data visualization using the Python programming language.

Class syllabus:
An introduction to the practical use of the Python programming language and the Pandas data processing library. The matplotlib library. Advanced plotting of graphs using the seaborn library (statistical distributions, confidence intervals, "heat maps", ...). Interactivity in data visualization using the Plotly library. Visualization of high-dimensional data. Methods for visualization of textual data. Data visualization in the context of machine learning.

Recommended literature:

Languages necessary to complete the course:
slovak, english

Notes:

Past grade distribution
Total number of evaluated students: 0

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

Lecturers: Mgr. Marek Šuppa

Last change: 27.06.2022

Approved by: doc. RNDr. Zuzana Chladná, Dr.

COURSE DESCRIPTION

Academic year: 2024/2025

University: Comenius University Bratislava

Faculty: Faculty of Mathematics, Physics and Informatics

Course ID:	**Course title:**
FMFI.KAMŠ/1-EFM-515/00	Algebra and Geometry Classes (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.

Educational level: I.

Prerequisites:

Course requirements:
Grading: homework, semester exams, activity in the class.
Scale of assessment (preliminary/final): 100/0

Learning outcomes:
Students are able to solve various problems required to pass the course Linear algebra and geometry (1).

Class syllabus:
See the syllabus of the subject Linear algebra and geometry (1).

Recommended literature:
Linear algebra and its applications / Gilbert Strang. Belmont : Thomson Brooks/Cole, 2006
Algebra a teoretická aritmetika 1 / Tibor Katriňák ... [et al.]. Bratislava : Univerzita Komenského, 1999

Languages necessary to complete the course:
Slovak, English

Notes:

Past grade distribution
Total number of evaluated students: 823

A	B	C	D	E	FX
43,01	12,88	17,62	14,7	5,83	5,95

Lecturers: Mgr. Martin Niepel, PhD., Mgr. Jakub Hrdina, PhD.

Last change: 12.03.2022

Approved by: doc. RNDr. Zuzana Chladná, Dr.

COURSE DESCRIPTION

Academic year: 2024/2025

University: Comenius University Bratislava

Faculty: Faculty of Mathematics, Physics and Informatics

Course ID:	**Course title:**
FMFI.KAMŠ/1-EFM-525/00	Algebra and Geometry Classes (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.

Educational level: I.

Prerequisites:

Course requirements:
Grading: homework, semester exams, activity in the class.
Scale of assessment (preliminary/final): 100/0

Learning outcomes:
Students are able to solve various problems required to pass the course Linear algebra and geometry (2).

Class syllabus:
See the programme of the subject Linear algebra and geometry (2).

Recommended literature:
Linear algebra and its applications / Gilbert Strang. Belmont : Thomson Brooks/Cole, 2006
Algebra a teoretická aritmetika 1 / Tibor Katriňák ... [et al.]. Bratislava : Univerzita Komenského, 1995

Languages necessary to complete the course:
Slovak, English

Notes:

Past grade distribution
Total number of evaluated students: 724

A	B	C	D	E	FX
55,66	16,85	14,09	6,91	2,21	4,28

Lecturers: Mgr. Martin Niepel, PhD., Mgr. Jakub Hrdina, PhD.

Last change: 12.03.2022

Approved by: doc. RNDr. Zuzana Chladná, Dr.

COURSE DESCRIPTION

Academic year: 2024/2025

University: Comenius University Bratislava

Faculty: Faculty of Mathematics, Physics and Informatics

Course ID:	**Course title:**
FMFI.KAMŠ/1-EFM-911/22	Bachelor Thesis Seminar

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

Number of credits: 2

Recommended semester: 5.

Educational level: I.

Prerequisites:

Course requirements:
Current evaluation: Bachelor thesis project
Indicative evaluation scale: if the student submits the project in the prescribed structure and content A (it is also possible to re-correct the project), otherwise FX
Scale of assessment (preliminary/final): 100/0

Learning outcomes:
: The student is informed about the basic regulations and requirements for content and formal aspects of bachelor thesis, citation technique and ethics. He/she has a thought-out structure of his bachelor thesis and a pre-established list of used literature.

Class syllabus:
Meetings with potential supervisors of bachelor theses and selection of bachelor thesis topic. Basic requirements for content and formal aspects of the bachelor thesis. Thesis objective. Structure of work. Citation technique and ethics. Methods of creating a bibliography.

Recommended literature:
Internal regulation no. 5/2010 Directive of the Rector of Comenius University in Bratislava, on the basic requirements for final and qualification theses, their bibliographic registration, control of originality, storage and access to Comenius University in Bratislava, www.uniba.sk
Teacher's electronic texts provided to students

Languages necessary to complete the course:
Slovak and English

Notes:

Past grade distribution
Total number of evaluated students: 249

A	B	C	D	E	FX
84,34	10,44	1,61	3,21	0,4	0,0

Lecturers: doc. RNDr. Zuzana Chladná, Dr.

Last change: 12.03.2022
Approved by: doc. RNDr. Zuzana Chladná, Dr.

STATE EXAM DESCRIPTION

Academic year: 2024/2025	
University: Comenius University Bratislava	
Faculty: Faculty of Mathematics, Physics and Informatics	
Course ID: FMFI.KAMŠ/1-EFM-991/22	**Course title:** Bachelor Thesis and its Defense
Number of credits: 10	
Educational level: I.	
Course requirements: Continuous assessment: submission of bachelor thesis Exam: oral, in the form of defending a bachelor's thesis before a state commission Scale of assessment (preliminary/final): 0/100	
Learning outcomes: The result of successful completion of the state subject will be a defended bachelor's thesis. Defending the thesis means that the student has demonstrated the ability to creatively apply the knowledge and skills acquired during the study to solve a given problem.	
Class syllabus: The student works on the topic of the final work under the guidance of the supervisor of his work. The results of the work are processed into written form according to prescribed standards. He submits the thesis and prepares for the defense. They will get acquainted with the testimonials of their work and prepare answers to them. He responds to the commission with comments and questions from the opinions, and participates in a discussion about the significance and main results of his work.	
State exam syllabus:	
Recommended literature: Literature as recommended by the supervisor and the student's own discretion. The student will list all used literature in the bachelor's thesis in the list of used literature.	
Languages necessary to complete the course: Slovak, English	
Last change: 17.06.2022	
Approved by: doc. RNDr. Zuzana Chladná, Dr.	

COURSE DESCRIPTION

Academic year: 2024/2025

University: Comenius University Bratislava

Faculty: Faculty of Mathematics, Physics and Informatics

Course ID:	**Course title:**
FMFI.KAMŠ/1-PMA-110/22	Basic Data Processing and Visualization

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.

Educational level: I.

Prerequisites:

Course requirements:
Preliminary evaluation: tests (60%), project (40%)
Rating scale: A 90%, B 80%, C 70%, D 60%, E 50%
Scale of assessment (preliminary/final): 100/0

Learning outcomes:
After completing the course, students will be able to use MS Excel, they will be able to use basic and more advanced functions for data processing and basic visualization, and they will get acquainted with the VBA language.

Class syllabus:
MS Excel environment, basic mathematical functions, cell formatting. Creating and working with tables. Data processing and cleaning, working with missing data. Basic types of graphs (bar, pie, histogram, etc.). Basics of VBA.

Recommended literature:
Microsoft Excel 2016 step by step Curtis Frye / Frye C, Redmond: Microsoft Press, 2015

Languages necessary to complete the course:
Slovak, English

Notes:
Maximum number of students: 24.

Past grade distribution
Total number of evaluated students: 65

A	B	C	D	E	FX
41,54	24,62	21,54	6,15	1,54	4,62

Lecturers: Mgr. Lívia Rosová, PhD.

Last change: 28.01.2025

Approved by: doc. RNDr. Zuzana Chladná, Dr.

COURSE DESCRIPTION

Academic year: 2024/2025

University: Comenius University Bratislava

Faculty: Faculty of Mathematics, Physics and Informatics

Course ID:	**Course title:**
FMFI.KAI/1-AIN-407/22	Brain and Mind

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: 3

Recommended semester: 1., 3., 5.

Educational level: I.

Prerequisites:

Course requirements:
Continuous assessment: presence (30%), presentation (40%), bonus assignments (30%)
Indicative assessment scale: A 90%, B 80%, C 70%, D 60%, E 50%
Scale of assessment (preliminary/final): 100/0

Learning outcomes:
The course objectives are to make the students familiar with major theories and methods of mind/ brain research.

Class syllabus:
The subject of the course is the human mind and brain from the perspective of neuroscience, computer science, psychology, and philosophy. It is mainly focused on the interdisciplinary study of consciousness: its neural correlates, neuroscience and behavioral research methods, and major theories.

Recommended literature:
S. Blackmore, E.T. Troscianko: Consciousnes. An Introduction. Routledge, third edition 2018.
M.S. Gazzaniga, R.B. Ivry, G.R. Mangun: Cognitive Neuroscience. The Biology of the Mind. W.W. Norton & company, fifth edition 2019.
J. Friedenberg, G. Silverman: Cognitive Science. An Introduction to the Study of Mind. Sage 2012.
T. Metzinger: The Ego Tunnel. The Science of the Mind and the Myth of the self. Basic Books 2009.

Languages necessary to complete the course:
Slovak, English

Notes:

Past grade distribution Total number of evaluated students: 235					
A	B	C	D	E	FX
50,64	15,32	13,19	9,79	2,98	8,09
Lecturers: RNDr. Barbora Cimrová, PhD., doc. PhDr. Ján Rybár, PhD.					
Last change: 04.07.2022					
Approved by: doc. RNDr. Zuzana Chladná, Dr.					

COURSE DESCRIPTION

Academic year: 2024/2025

University: Comenius University Bratislava

Faculty: Faculty of Mathematics, Physics and Informatics

Course ID:	**Course title:**
FMFI.KAMŠ/1-EFM-571/24	Climate Change Economics

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: 6.

Educational level: I.

Prerequisites:

Course requirements:
Evaluation of the course consists of the final exam (60%), homework (30%) and exercises during lectures (10%). In addition, it is necessary to obtain a minimum of 50% from both the interim assessment and the final exam.
Grading scale: A 100-91%, B 90-81%, C 80-71%, D 70-61%, E 60-51%
Scale of assessment (preliminary/final): 40/60

Learning outcomes:
The student will gain an overview of economics of decarbonization technologies and teconomic instruments suitable for addressing externalities.

Class syllabus:
The the course aims to provide a deeper theoretical insight into the issue of economic externalities, such as global warming. The course will introduce several classic economic tools that are used to solve externalities in the field of public finances (Pigou's tax, cap-and-trade programs, subsidies, etc.). The second part of the course will be devoted to the issue of decarbonization technologies, such as heat pumps or electric cars. In the context of solving the problem of global warming, we will evaluate the economic benefit of these technologies and present the current progress in the field.

Recommended literature:
Gruber, J. 2016. Public Finance and Public Policy. Macmillan.
Harris, J. M., and Roach, B. 2018. Environmental and Natural Resource Economics: A Contemporary Approach. ME Sharpe.
Schotter, A. 2009. Microeconomics: A Modern Approach. Cengage Learning.

Languages necessary to complete the course:
English, Slovak

Notes:
The course is a part of the cooperation of the EFM study program with CERGE-EI on their Distance learning program. The course will be conducted in a partially cumulative form: (3P+1C) per week during 6 weeks from the beginning of the semester. The final exam will be held the

week after the end of the course, the make-up exam a week later. Lectures on the subject will take place in electronic form in English, exercises in person.

Past grade distribution
Total number of evaluated students: 6

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

Lecturers: Mgr. Jana Szolgayová, PhD.

Last change: 05.06.2024

Approved by: doc. RNDr. Zuzana Chladná, Dr.

COURSE DESCRIPTION

Academic year: 2024/2025

University: Comenius University Bratislava

Faculty: Faculty of Mathematics, Physics and Informatics

Course ID:	**Course title:**
FMFI.KAI/1-AIN-408/22	Cognitive Laboratory

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., 5.

Educational level: I.

Prerequisites:

Course requirements:
Interim evaluation: presentations
Indicative assessment scale: A 90%, B 80%, C 70%, D 60%, E 50%
Scale of assessment (preliminary/final): 100/0

Learning outcomes:
Acquisition of methods for studying various cognitive phenomena (data collection and analysis) using an online cognitive laboratory.

Class syllabus:
Demonstration of 40 standard experiments in the fields of neurocognition, mechanisms of perception, attention systems, memory processes, speech production and perception, knowledge representation (concepts and mental ideas), judgment and decision-making processes.

Recommended literature:
CogLab / Greg Francis, Ian Neath, Daniel R. VanHorn. Thomson/Wadsworth, 2014

Languages necessary to complete the course:
Slovak, English

Notes:

Past grade distribution
Total number of evaluated students: 94

A	B	C	D	E	FX
64,89	12,77	9,57	1,06	0,0	11,7

Lecturers: doc. PhDr. Ján Rybár, PhD.

Last change: 17.05.2024

Approved by: doc. RNDr. Zuzana Chladná, Dr.

COURSE DESCRIPTION

Academic year: 2024/2025

University: Comenius University Bratislava

Faculty: Faculty of Mathematics, Physics and Informatics

Course ID:	**Course title:**
FMFI.KAMŠ/1-EFM-340/13	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: 5.

Educational level: I., II.

Prerequisites: (FMFI.KAMŠ/1-MAT-282/00 - Probability and Statistics (2) or PriF-FMFI.KAMŠ/N-bBXX-082/22 - Mathematics for the Biology or FMFI.KAMŠ/1-DAV-201/20 - Fundamentals of Probability and Statistics)

Recommended prerequisites:
Probability and statistics (2) 1-MAT-282 or Probability and statistics 2-INF-175

Course requirements:
project (teaching period), written exam using computer
Approximate grade thresholds: A 90%, B 80%, C 70%, D 60%, E 50%
Scale of assessment (preliminary/final): 20/80

Learning outcomes:
Using the software "R" students will be able to perform basic statistical analysis of real data.

Class syllabus:
History of R and comparison with other systems. Arithmetic, logical operators. Data import and visualization, descriptive statistics. Tests of normality. Tests about location parameters, proportions, and correlation coefficients. Linear regression: estimates, tests, confidence regions, submodels, diagnostic. ANOVA. Modern methods of statistics (cluster and discriminant analysis, Monte Carlo).

Recommended literature:
Dalgaard P: Introductory Statistics with R. Springer 2008.
Anděl J: Statistické metody. Matfyzpress 2007.
Venables W N et al.: An Introduction to R. The R Foundation 2021.

Languages necessary to complete the course:
Slovak, English

Notes:

Past grade distribution
Total number of evaluated students: 455

A	B	C	D	E	FX
62,42	11,87	9,01	8,35	5,05	3,3

Lecturers: Mgr. Ján Somorčík, PhD.
Last change: 11.03.2022
Approved by: doc. RNDr. Zuzana Chladná, Dr.

COURSE DESCRIPTION

Academic year: 2024/2025

University: Comenius University Bratislava

Faculty: Faculty of Mathematics, Physics and Informatics

Course ID:	**Course title:**
FMFI.KAMŠ/1-EFM-240/15	Corporate Finance

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: 4.

Educational level: I.

Prerequisites: FMFI.KAMŠ/1-MAT-281/00 - Probability and Statistics (1)

Course requirements:
Continuous assessment: Presentation of a project on a given topic.
Examination: Written test
Grading scale: A 91%, B 81%, C 71%, D 61%, E 51%
Scale of assessment (preliminary/final): 30/70

Learning outcomes:
By the end of this course, students should be able to demonstrate an understanding of the basic principles of investment and financial decision making processes of the firm.

Class syllabus:
Introduction to issues in corporate finance. Financial ratios. Time value of money, compounding and discounting. Valuation of stocks and bonds. Investment criteria, sensitivity analysis, decision trees. Yield and risk. Portfolio theory, Capital Asset Pricing Model (CAPM). Capital Structure. Tax Shield. Financial distress and bankruptcy. Dividend policy.

Recommended literature:
Brealey, R. A., Myers, S.C.: Principles of Corporate Finace, McGraw Hill, 13th Edition, 2020
Brealey, R. A., Myers S.C.: Teorie a praxe firemních financí, Computer Press, Praha, 2000
Damodaran, A.: Corporate Finance, John Wiley and Sons, 2001
Ross, A. R., Westerfield, R.W., Jaffe, J.: Corporate Finance, McGraw Hill, 5th Edition, 1999

Languages necessary to complete the course:
Slovak, English

Notes:

Past grade distribution
Total number of evaluated students: 263

A	B	C	D	E	FX
26,62	19,77	17,49	16,73	16,73	2,66

Lecturers: doc. RNDr. Zuzana Chladná, Dr.

Last change: 09.03.2022
Approved by: doc. RNDr. Zuzana Chladná, Dr.

COURSE DESCRIPTION

Academic year: 2024/2025

University: Comenius University Bratislava

Faculty: Faculty of Mathematics, Physics and Informatics

Course ID:	**Course title:**
FMFI.KAMŠ/1-EFM-556/15	DEA Models

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: I.

Prerequisites: FMFI.KAMŠ/1-EFM-220/00 - Linear Programming or FMFI.KMANM/1-MMN-255/00 - Linear Programming

Course requirements:
Continuous assessment: project 30%, small written exams or homeworks 20% , a necessary condition to obtain at least 10% of the 30% evaluation for the project
Examination: written 50%, possible oral exam (improvement or deterioration of the achieved evaluation by one degree)
Indicative assessment scale: A 90%, B 80%, C 70%, D 60%, E 50%
Scale of assessment (preliminary/final): 50/50

Learning outcomes:
Upon completion of the course students will understand the fundamentals of DEA models and will be able to use them for evaluating the effectiveness of units within a given group.

Class syllabus:
Introduction to DEA modelling, different approaches to DEA modeling, efficiency and effectiveness, CCR model, BCC model, range efficiency, additive model, basic model properties, model invariance, monotonous efficiency, input / output additions, returns to scale, superefektivity, rules for correct application of DEA models, SBM model, AR model.

Recommended literature:
Data envelopment analysis : A comprehensive Text with Models, applications, references and DEA- Solver software / William W. Cooper [et al.]. Boston : Kluwer , 2004
M. Halická: Učebné texty k predmetu DEA modely dostupné na www.iam.fmph.uniba.sk/institute/halicka/text/TextDEA35.pdf

Languages necessary to complete the course:
Slovak, English

Notes:

Past grade distribution Total number of evaluated students: 272					
A	B	C	D	E	FX
46,32	24,26	15,81	8,46	3,31	1,84
Lecturers: doc. RNDr. Margaréta Halická, CSc.					
Last change: 17.06.2022					
Approved by: doc. RNDr. Zuzana Chladná, Dr.					

COURSE DESCRIPTION

Academic year: 2024/2025

University: Comenius University Bratislava

Faculty: Faculty of Mathematics, Physics and Informatics

Course ID:	**Course title:**
FMFI.KAMŠ/1-PMA-750/22	Data Analysis and Visualization

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.

Educational level: I.

Prerequisites: FMFI.KAMŠ/1-MAT-281/00 - Probability and Statistics (1)

Course requirements:
Preliminary evaluation: tests (40%), project (60%)
Rating scale: A 90%, B 80%, C 70%, D 60%, E 50%
Scale of assessment (preliminary/final): 100/0

Learning outcomes:
After completing the course the students will be able to use the MS Excel environment for processing, visualizing and analyzing real data.

Class syllabus:
Mathematical functions in MS Excel. Probability distributions. Processing and visualization of the data. Excel VBA introduction. Descriptive statistics. Parameter estimation, hypothesis testing, regression analysis.
Probability distributions in MS Excel (probability, distribution, quantile functions, data generation). Descriptive statistics in MS Excel environment (sample characteristics). Advanced data vizualization methods (eg box plot, time series vizualization), Power BI. Basics of inference statistics (parameter estimation, hypothesis testing, linear regression analysis). Solver and Data Analysis add-ins.

Recommended literature:
Pravdepodobnosť a štatistika / Katarína Janková, Andrej Pázman. Bratislava: Univerzita Komenského, 2011
Štatistika v Exceli 2007 / Jozef Chajdiak. Statis, Bratislava 2009

Languages necessary to complete the course:
Slovak, English

Notes:

Past grade distribution Total number of evaluated students: 258					
A	B	C	D	E	FX
37,21	22,48	18,99	10,85	6,2	4,26
Lecturers: Mgr. Lívia Rosová, PhD.					
Last change: 21.06.2022					
Approved by: doc. RNDr. Zuzana Chladná, Dr.					

COURSE DESCRIPTION

Academic year: 2024/2025

University: Comenius University Bratislava

Faculty: Faculty of Mathematics, Physics and Informatics

Course ID:	**Course title:**
FMFI.KAMŠ/1-EFM-310/00	Difference and Differential Equations

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: 6.

Educational level: I.

Prerequisites: FMFI.KAMŠ/1-EFM-210/00 - Mathematical Analysis (3) and (FMFI.KAG/1-MAT-160/15 - Linear Algebra and Geometry (2) or FMFI.KAG/1-EFM-160/12 - Linear Algebra and Geometry (2))

Course requirements:
Continuous assessment: Written exam and homework
Exam: Written and oral exam
Approximate rating: A 90%, B 80%, C 70%, D 60%, E 50%
Scale of assessment (preliminary/final): 20/80

Learning outcomes:
Students master basic methods of modelling the dynamical processes with discrete and continuous time variable using difference and differential equations, with special regard to their application in economics and finance.

Class syllabus:
Difference equations: One-dimensional and higher-dimensional linear equations, affine and nonlinear equations, solutions and their stability.
Differential equations: One-dimensional linear, affine and nonlinear equations. Higher-dimensional linear equations. General theory of differential equations. One-dimensional and two-dimensional autonomous equations. Integrals of differential equations, conservative systems with one degree of freedom.

Recommended literature:
P. Brunovský: Dynamické systémy a diferenciálne rovnice, text MFFUK
www.iam.fmph.uniba.sk/skripta/brunovsky
M. Greguš, V. Šeda, M. Švec: Obyčajné diferenciálne rovnice, Alfa 1985
J. T. Sandefur: Discrete dynamical systems. Clarendon 1990
G. Gandolfo: Economic Dynamics, Springer

Languages necessary to complete the course:
Slovak, English

Notes:

Past grade distribution Total number of evaluated students: 671					
A	B	C	D	E	FX
29,51	24,89	17,88	15,8	10,73	1,19
Lecturers: doc. RNDr. Peter Guba, PhD., doc. Mgr. Pavol Bokes, PhD., Mgr. Anna Hlubinová					
Last change: 11.03.2022					
Approved by: doc. RNDr. Zuzana Chladná, Dr.					

COURSE DESCRIPTION

Academic year: 2024/2025

University: Comenius University Bratislava

Faculty: Faculty of Mathematics, Physics and Informatics

Course ID:	**Course title:**
FMFI.KAMŠ/1-EFM-380/00	Econometrics

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: 6.

Educational level: I., II.

Prerequisites: FMFI.KAMŠ/1-EFM-330/00 - Statistical Methods or FMFI.KAMŠ/2-MMN-380/22 - Time Series Analysis or FMFI.KAMŠ/2-PMS-107/15 - Regression Models or FMFI.KAMŠ/1-DAV-303/20 - Statistical Methods or FMFI.KAMŠ/1-PMA-510/00 - Basics of Mathematical Statistics

Recommended prerequisites:
Statistical methods 1-EFM-330 or Statistical methods 1-DAV-303 or Computer statistics 2-MMN-106

Course requirements:
Continuing evaluation: project (10%) and test (20%); at least 10% out of 30% are needed to proceed to the final exam
Exam: written exam
Approximate grade thresholds: A 90%, B 80%, C 70%, D 60%, E 50%
Scale of assessment (preliminary/final): 30/70

Learning outcomes:
Students are able to perform standard linear regression analysis and also are able to apply it in real econometric research. They also understand the mathematics behind these methods, being a necessary condition for further studies in this subject.

Class syllabus:
Linear regression, the geometry behind it, and LS-estimators of parameters. Decomposition of the Total Sum of Squares, coefficients of determination, and the Akaike information criterion. Properties of the parameter estimators and of the error term variance estimator. Gauss-Markov theorem. Tests of linear hypotheses about parameters. Restricted regression. Model specification errors and their diagnostic. Dummy variables. Generalized least squares. Heteroscedasticity: testing for and dealing with. Autocorrelation: testing for and dealing with.

Recommended literature:
Johnston J, DiNardo J: Econometric methods 4th ed. McGraw Hill 1997;
Greene W: Econometric Analysis 8th ed. Pearson 2017;
Zvára K: Regrese. MatfyzPress, 2008.

Languages necessary to complete the course:
Slovak, English

Notes:

Past grade distribution
Total number of evaluated students: 1330

A	B	C	D	E	FX
28,87	16,17	17,97	16,99	16,77	3,23

Lecturers: Mgr. Ján Somorčík, PhD., Mgr. Samuel Rosa, PhD., Mgr. Pál Somogyi, PhD.

Last change: 25.06.2022

Approved by: doc. RNDr. Zuzana Chladná, Dr.

COURSE DESCRIPTION

Academic year: 2024/2025

University: Comenius University Bratislava

Faculty: Faculty of Mathematics, Physics and Informatics

Course ID:	**Course title:**
FMFI.KAMŠ/1-EFM-120/17	Economics (1)

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

Number of credits: 4

Recommended semester: 1.

Educational level: I.

Prerequisites:

Course requirements:
Continuous test.
Final test-
Scale of assessment (preliminary/final): 40/60

Learning outcomes:
Students will understand the basics of neoclassical, textbook economics.

Class syllabus:
Market forces - demand, supply.
Costs, cost function.
Basic market models.
Perfect competition.
Monopoly.
Monopolistic competition.
Oligopoly markets.
Pricing.
The role of government in a market economy.

Recommended literature:
Michael Baye: Managerial Economics and Bussines Strategy.

Languages necessary to complete the course:
Slovak, English

Notes:

Past grade distribution
Total number of evaluated students: 607

A	B	C	D	E	FX
16,14	18,95	16,97	20,76	13,51	13,67

Lecturers: doc. RNDr. Ján Boďa, CSc.

Last change: 09.03.2022
Approved by: doc. RNDr. Zuzana Chladná, Dr.

COURSE DESCRIPTION

Academic year: 2024/2025

University: Comenius University Bratislava

Faculty: Faculty of Mathematics, Physics and Informatics

Course ID:	**Course title:**
FMFI.KAMŠ/1-EFM-140/17	Economics (2)

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

Number of credits: 4

Recommended semester: 2.

Educational level: I.

Prerequisites:

Antirequisites: FMFI.KMANM/1-MMN-256/22

Course requirements:
Mid-term test, final test.
Scale of assessment (preliminary/final): 40/60

Learning outcomes:
Understanding the basics of how the country's economy as a whole works. The role of government and central bank.

Class syllabus:
Gross domestic product. Total demand in the economy. IS-LM model. Government fiscal policy. Central bank monetary policy. Labor market. Total supply in the economy. Inflation. AS-AD model. Open economy.

Recommended literature:
Olivier Blanchard: Macroeconomics

Languages necessary to complete the course:
Slovak, English

Notes:

Past grade distribution
Total number of evaluated students: 411

A	B	C	D	E	FX
22,14	26,76	21,41	14,84	9,25	5,6

Lecturers: doc. RNDr. Ján Boďa, CSc.

Last change: 09.03.2022

Approved by: doc. RNDr. Zuzana Chladná, Dr.

COURSE DESCRIPTION

Academic year: 2024/2025

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: 3., 5.

Educational level: I., 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. RNDr. Zuzana Chladná, Dr.

COURSE DESCRIPTION

Academic year: 2024/2025

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: 4., 6.

Educational level: I., 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. RNDr. Zuzana Chladná, Dr.

COURSE DESCRIPTION

Academic year: 2024/2025

University: Comenius University Bratislava

Faculty: Faculty of Mathematics, Physics and Informatics

Course ID:	**Course title:**
FMFI.KJP/1-MXX-131/00	English 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.

Educational level: I.

Prerequisites:

Course requirements:
Grades: A 93%, B 85%, C 77%, D 70%, E 65%
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:
The objective of the subject is to provide the students with experience and knowledge of technical English and thus make them ready to use English sources of information for later study and professional career.

Class syllabus:
On entering the first semester, students´ knowledge of English is tested and they are divided into groups according to the results of the placement test. In the groups of pre-intermediate and intermediate students, fundamentals of technical English are taught. Advanced students take classes of technical English for their field of study: English for mathematics, for physics, for computer science, English for management and economic and financial mathemathics.

Recommended literature:
Anglický jazyk pre študentov FMFI UK : Kurz pre mierne pokročilých / Alena Zemanová.
The textbook has not been published. It is at students' disposal in an electronic format.
Anglický jazyk pre študentov FMFI UK : Aplikovaná matematika / Alexandra Maďarová, Ľubomíra Kožehubová.
The textbook has not been published. It is at students' disposal in an electronic format.
Anglický jazyk pre študentov FMFI UK : Matematika / kolektív autorov KJP.
The textbook has not been published. It is at students' disposal in an electronic format.
Anglický jazyk pre študentov FMFI UK : Fyzika / Alena Zemanová.
The textbook has not been published. It is at students' disposal in an electronic format.
Anglický jazyk pre študentov FMFI UK : Informatika / Elena Klátiková.
The textbook has not been published. It is at students' disposal in an electronic format.

Languages necessary to complete the course:
Slovak, English

Notes:

Past grade distribution
Total number of evaluated students: 7138

A	B	C	D	E	FX
29,55	23,12	18,17	12,55	7,85	8,77

Lecturers: Mgr. Eva Foltánová, Mgr. Ing. Jana Kočvarová, Mgr. Ľubomíra Kožehubová, Mgr. Alexandra Maďarová, PhDr. Alena Zemanová, Mgr. Aneta Barnes, Mgr. Simona Dobiašová, PhD.

Last change: 20.06.2022

Approved by: doc. RNDr. Zuzana Chladná, Dr.

COURSE DESCRIPTION

Academic year: 2024/2025

University: Comenius University Bratislava

Faculty: Faculty of Mathematics, Physics and Informatics

Course ID:	**Course title:**
FMFI.KJP/1-MXX-132/00	English 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.

Educational level: I.

Prerequisites:

Course requirements:
Grades: A 93%, B 85%, C 77%, D 70%, E 65%
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:
The objective of the subject is to provide the students with experience and knowledge of technical English and thus make them ready to use English sources of information for later study and professional career.

Class syllabus:
This is a continuation of the course English (1) designed for pre-intermediate students. Fundamental vocabulary is presented through selected topics in mathematics, physics and informatics. The lessons also contain revision of elementary grammar. Generally, it is a necessary preliminary to advanced programs.

Recommended literature:
Anglický jazyk pre študentov FMFI UK : Kurz pre mierne pokročilých / Alena Zemanová.
The textbook has not been published. It is at students' disposal in an electronic format.

Languages necessary to complete the course:
Slovak, English

Notes:

Past grade distribution
Total number of evaluated students: 1733

A	B	C	D	E	FX
22,1	20,95	23,83	14,77	11,08	7,27

Lecturers: PhDr. Alena Zemanová, Mgr. Ing. Jana Kočvarová, Mgr. Alexandra Maďarová, Mgr. Ľubomíra Kožehubová, Mgr. Eva Foltánová, Mgr. Aneta Barnes, Mgr. Simona Dobiašová, PhD.
Last change: 20.06.2022
Approved by: doc. RNDr. Zuzana Chladná, Dr.

COURSE DESCRIPTION

Academic year: 2024/2025

University: Comenius University Bratislava

Faculty: Faculty of Mathematics, Physics and Informatics

Course ID:	**Course title:**
FMFI.KJP/1-MXX-231/00	English 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.

Educational level: I.

Prerequisites:

Course requirements:
Grades: A 93%, B 85%, C 77%, D 70%, E 65%
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:
The objective of the classes is to provide the students with knowledge of technical English in their field of study and experience with technical English sources sufficient to make the able to use technical language for their later study and professional purposes.

Class syllabus:
The subject continues the program of English (2). Students take classes of special English for their field of study: English for mathematics, English for physics, English for computer science, English for management and economic and financial mathemathics.
The subject requires advanced knowledge of general English.

Recommended literature:
Anglický jazyk pre študentov FMFI UK : Kurz pre mierne pokročilých / Alena Zemanová.
The textbook has not been published. It is at students' disposal in an electronic format.
Anglický jazyk pre študentov FMFI UK : Aplikovaná matematika / Alexandra Maďarová, Ľubomíra Kožehubová.
The textbook has not been published. It is at students' disposal in an electronic format.
Anglický jazyk pre študentov FMFI UK : Matematika / kolektív autorov KJP.
The textbook has not been published. It is at students' disposal in an electronic format.
Anglický jazyk pre študentov FMFI UK : Fyzika / Alena Zemanová.
The textbook has not been published. It is at students' disposal in an electronic format.
Anglický jazyk pre študentov FMFI UK : Informatika / Elena Klátiková.
The textbook has not been published. It is at students' disposal in an electronic format.

Languages necessary to complete the course:

Slovak, English

Notes:

Past grade distribution
Total number of evaluated students: 1422

A	B	C	D	E	FX
15,47	19,06	22,78	18,35	18,0	6,33

Lecturers: PhDr. Alena Zemanová, Mgr. Ing. Jana Kočvarová, Mgr. Alexandra Maďarová, Mgr. Ľubomíra Kožehubová, Mgr. Eva Foltánová, Mgr. Aneta Barnes, Mgr. Simona Dobiašová, PhD.

Last change: 20.06.2022

Approved by: doc. RNDr. Zuzana Chladná, Dr.

COURSE DESCRIPTION

Academic year: 2024/2025

University: Comenius University Bratislava

Faculty: Faculty of Mathematics, Physics and Informatics

Course ID:	**Course title:**
FMFI.KJP/1-MXX-232/10	English 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.

Educational level: I.

Prerequisites:

Course requirements:
Examination: an examination consisting of a written and an oral part.
Grades: A 93%, B 85%, C 77%, D 70%, E 65%
Course prerequisites:
https://fmph.uniba.sk/microsites/kjp/katedra-jazykovej-pripravy/skuska-z-predmetu-anglicky-jazyk-4/
Scale of assessment (preliminary/final): 0/100

Learning outcomes:
After completing the course, students will be able to work independently with professional literature in English

Class syllabus:
Students take classes of special English for their field of study: English for mathematics, English for physics, English for computer science, English for management and economic and financial mathemathics.

Recommended literature:
Anglický jazyk pre študentov FMFI UK : Kurz pre mierne pokročilých / Alena Zemanová.
The textbook has not been published. It is at students' disposal in an electronic format.
Anglický jazyk pre študentov FMFI UK : Aplikovaná matematika / Alexandra Maďarová, Ľubomíra Kožehubová.
The textbook has not been published. It is at students' disposal in an electronic format.
Anglický jazyk pre študentov FMFI UK : Matematika / kolektív autorov KJP.
The textbook has not been published. It is at students' disposal in an electronic format.
Anglický jazyk pre študentov FMFI UK : Fyzika / Alena Zemanová.
The textbook has not been published. It is at students' disposal in an electronic format.
Anglický jazyk pre študentov FMFI UK : Informatika / Elena Klátiková.
The textbook has not been published. It is at students' disposal in an electronic format.

Languages necessary to complete the course:
Slovak, English

Notes:

Past grade distribution
Total number of evaluated students: 4296

A	B	C	D	E	FX
25,16	28,17	21,58	11,82	6,05	7,22

Lecturers: Mgr. Alexandra Maďarová, PhDr. Alena Zemanová, Mgr. Ľubomíra Kožehubová, Mgr. Eva Foltánová, Mgr. Aneta Barnes, Mgr. Simona Dobiašová, PhD., Mgr. Katarína Hromadová, PhD., Mgr. Ing. Jana Kočvarová

Last change: 17.06.2022

Approved by: doc. RNDr. Zuzana Chladná, Dr.

COURSE DESCRIPTION

Academic year: 2024/2025

University: Comenius University Bratislava

Faculty: Faculty of Mathematics, Physics and Informatics

Course ID:	**Course title:**
FMFI.KAMŠ/1-EFM-570/00	Experimental Economics

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: 6.

Educational level: I.

Prerequisites:

Course requirements:
Continuous assessment: based on the evaluation of written protocols from the performed experiments
Indicative assessment scale: A 100-90%, B 89-80%, C 79-70%, D 69-60%, E 59-50%
Scale of assessment (preliminary/final): 100/0

Learning outcomes:
Students will be able to verify the principles on which economic theory is built. They can construct an experiment to support / refute new hypotheses in further research.

Class syllabus:
1. Competitive Markets (Supply and Demand. Shifting Supply.)
2. Market Intervention and Public Policy (A Sales Tax. Prohibition. A Minimum Wage.)
3. Imperfect Markets (Externalities. Monopolies and Cartels.)
4. Firms a technology (Entry and Exit. Network Externalities. Measuring Productivity. Comparative Advantage.)
5. Information, Auctions, Bargaining (Adverse Selection. Auctions. Bargaining.)

Recommended literature:
The Handbook of experimental economics / Editors John H. Kagel, Alvin E. Roth. Princeton : Princeton University Press, 1995
Theodore Bergstrom - John H. Miller: Experiments with Economic Principles: Microeconomics, McGraw-Hill, 2000.

Languages necessary to complete the course:
Slovak, English

Notes:

Past grade distribution
Total number of evaluated students: 133

A	B	C	D	E	FX
98,5	0,0	1,5	0,0	0,0	0,0

Lecturers: doc. RNDr. Ján Pekár, PhD.

Last change: 15.06.2022

Approved by: doc. RNDr. Zuzana Chladná, Dr.

COURSE DESCRIPTION

Academic year: 2024/2025

University: Comenius University Bratislava

Faculty: Faculty of Mathematics, Physics and Informatics

Course ID:	**Course title:**
FMFI.KAMŠ/1-EFM-370/00	Financial Mathematics

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: 5.

Educational level: I., II.

Prerequisites: FMFI.KAMŠ/1-EFM-250/00 - Mathematical Analysis (4) or FMFI.KAMŠ/1-DAV-102/20 - Calculus (1) or FMFI.KMANM/1-MAT-250/22 - Mathematical Analysis (4) or FMFI.KMANM/1-MAT-250/14 - Mathematical Analysis (4)

Course requirements:
Evaluation during the semester: Project, written test, activity during exercises
Written exam. Voluntary oral examination to improve the final evaluation.
Informative evaluation scale: A 90%, B 80%, C 70%, D 60%, E 50%
Scale of assessment (preliminary/final): 50/50

Learning outcomes:
After completing the course, students will understand the basic principles of interest rate theory and bond investment management. They will also get acquainted with the principles of stock portfolio management. In the last part of the lecture, they will learn to price derivatives of the European and American type using binomial trees and will also get acquainted with Black-Scholes formulas for pricing put and call options.

Class syllabus:
Coupon and zero-coupon bonds, term structure of interest rates, bootstrap method, yield to maturity, forward rates, duration.
Risk aversion, properties of utility functions, utility functions and mean-variance analysis, the problem of Markowitz, Capital Asset Pricing Model (CAMP).
Binomial tree model, risk-neutral probabilities, risk-neutral pricing formula, Black-Scholes formula, pricing of american options.

Recommended literature:
Baxter M., Rennie A.: Financial Calculus
Hull J.: Options, Futures and Other Derivatives
Luenberger D.: Investment Science

Languages necessary to complete the course:
English, Slovak

Notes:

Past grade distribution Total number of evaluated students: 712					
A	B	C	D	E	FX
58,71	21,07	10,81	6,04	2,67	0,7
Lecturers: doc. Mgr. Igor Melicherčík, PhD., Mgr. Alex Babiš, PhD.					
Last change: 20.06.2022					
Approved by: doc. RNDr. Zuzana Chladná, Dr.					

COURSE DESCRIPTION

Academic year: 2024/2025

University: Comenius University Bratislava

Faculty: Faculty of Mathematics, Physics and Informatics

Course ID:	**Course title:**
FMFI.KAMŠ/1-EFM-552/17	Financial System and Financial Stability

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: 5.

Educational level: I.

Prerequisites: FMFI.KAMŠ/1-EFM-280/00 - Money and Banking

Recommended prerequisites:
1-EFM-280/00 Money and Banking

Course requirements:
Interim evaluation: Active participation / presentation
Concluding evaluation: Written exam
Approximate rating scale: A 90%, B 80%, C 70%, D 60%, E 50%
Scale of assessment (preliminary/final): 60/40

Learning outcomes:
Student controls the main principles of the international financial system, imbalances affecting financial stability and tools to mitigate systemic risk

Class syllabus:
Money, the ECB's monetary system and policy, Balance of payments, Risks - Slovak and global context, Financial cycle, Financial crisis, Financial stability, Macro-prudential policy.

Recommended literature:
Jílek, J. [2013] Finance v globální ekonomice. Grada, 2013

Languages necessary to complete the course:
Slovak

Notes:

Past grade distribution
Total number of evaluated students: 87

A	B	C	D	E	FX
36,78	32,18	18,39	8,05	2,3	2,3

Lecturers: PhDr. Štefan Rychtárik, PhD.

Last change: 09.03.2022

Approved by: doc. RNDr. Zuzana Chladná, Dr.

COURSE DESCRIPTION

Academic year: 2024/2025

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.

Educational level: I., 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. RNDr. Zuzana Chladná, Dr.

COURSE DESCRIPTION

Academic year: 2024/2025

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.

Educational level: I., 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. RNDr. Zuzana Chladná, Dr.

COURSE DESCRIPTION

Academic year: 2024/2025

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.

Educational level: I., 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. RNDr. Zuzana Chladná, Dr.

COURSE DESCRIPTION

Academic year: 2024/2025

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.

Educational level: I., 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. RNDr. Zuzana Chladná, Dr.

COURSE DESCRIPTION

Academic year: 2024/2025

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.

Educational level: I., 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. RNDr. Zuzana Chladná, Dr.

COURSE DESCRIPTION

Academic year: 2024/2025

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.

Educational level: I., 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: 542

A	B	C	D	E	FX
38,01	19,56	19,56	12,36	3,51	7,01

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

Last change: 21.06.2022

Approved by: doc. RNDr. Zuzana Chladná, Dr.

COURSE DESCRIPTION

Academic year: 2024/2025

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.

Educational level: I., 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. RNDr. Zuzana Chladná, Dr.

COURSE DESCRIPTION

Academic year: 2024/2025

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.

Educational level: I., 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. RNDr. Zuzana Chladná, Dr.

COURSE DESCRIPTION

Academic year: 2024/2025

University: Comenius University Bratislava

Faculty: Faculty of Mathematics, Physics and Informatics

Course ID:	**Course title:**
FMFI.KAI/1-MXX-491/22	Inclusive Approaches to Education of Students with Special Educational Needs

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.

Educational level: I.

Prerequisites:

Course requirements:
Continuous assessment: active participation in class (elaboration of assigned tasks, participation in discussions)
An exam: -
Indicative assessment level: e.g. A 90%, B 80%, C 70%, D 60%, E 50%
Scale of assessment (preliminary/final): 100/0

Learning outcomes:
The student:
- They will get acquainted with the basic characteristics of types of health disadvantage (HR) and will know the consequences of HR on education.
- Gain personal experience from meetings with people with disabilities and will be able to explain and apply the rules of communication with them.
- Can characterize the forms of education of students with SEN and assess the possibilities of their pedagogical, technical and human support, which positively affect the success of education.

Class syllabus:
- Characteristics of basic concepts.
- Disability models.
- Disability legislation.
- Human, communication, information and architectural barriers.
- Impact of disability on education.
- Segregation - integration - inclusion.
- Information access technologies for people with disabilities.
- Possibilities and limits of creating equal conditions for the education of pupils with specific educational needs.
- Inclusive school - education for all.
- The importance of education for the social inclusion of people with disabilities.

Recommended literature:

- Lechta, V. (ed): Inkluzivní pedagogika. Praha: Portál, 2016, ISBN 978-80-262-1123-5
- Slowík, J.: Komunikace s lidmi a postižením. Praha: Portál, 2010, ISBN 978-80-7367-691-9
- Kol. autorov: Od integrácie k inklúzii. VÚDPaP: Bratislava, 2018, ISBN 978-80-89698-27-1

Languages necessary to complete the course:
Slovak

Notes:

Past grade distribution
Total number of evaluated students: 105

A	B	C	D	E	FX
74,29	20,0	3,81	0,0	0,0	1,9

Lecturers: Mgr. Ľudmila Hlinová

Last change: 15.03.2022

Approved by: doc. RNDr. Zuzana Chladná, Dr.

COURSE DESCRIPTION

Academic year: 2024/2025

University: Comenius University Bratislava

Faculty: Faculty of Mathematics, Physics and Informatics

Course ID:	**Course title:**
FMFI.KAMŠ/1-MMN-370/00	Insurance Mathematics

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: 5.

Educational level: I.

Prerequisites: FMFI.KAMŠ/1-MAT-282/00 - Probability and Statistics (2)

Course requirements:
The course assessment consists of two tests, which are usually written during the semester, with the same evaluation weight (50% and 50%, respectively). To successfully complete the course, it is necessary to obtain at least half of the points on the first test, and at least half of the points on the second test.
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 student receives an overview of the basics of insurance business, classical life insurance products, net and gross premium calculation and methods of reserving. Student will be able to solve basic problems in life insurance mathematics.

Class syllabus:
Introduction to insurance business. Life tables, biometric (mortality) risk. Life insurance - deterministic approach, equivalence principle, assets and liabilities of the insurance company. Basic and some other types of life insurance: pure endowment, term insurance, endowment, insurance with a fixed-period payout. Whole life insurance, temporary insurance and deferred insurance. Life annuities: present value of life annuities, annuity-due and immediate annuity, linearly increasing and linearly decreasing annuities, temporary and whole life annuities. Single premium and periodic premiums. Net premiums and gross premiums. The stochastic model of life insurance, future lifetime, expected future lifetime, mortality laws. Continuous methods of actuarial mathematics, insurances payable at the moment of death, continuously payable life annuities. Net premium reserves, expense-loaded premium reserves, gross premium, adequate reserves, Zillmer reserve, technical provisions, calculation of premium reserves in the case of single premium and periodic premiums.

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, ISBN 978-80-85659-71-9;
study materials of the lecturer.

Languages necessary to complete the course:
Slovak, English

Notes:

Past grade distribution
Total number of evaluated students: 571

A	B	C	D	E	FX
33,1	18,56	20,49	15,59	9,81	2,45

Lecturers: Mgr. Gábor Szűcs, PhD.

Last change: 16.06.2022

Approved by: doc. RNDr. Zuzana Chladná, Dr.

COURSE DESCRIPTION

Academic year: 2024/2025

University: Comenius University Bratislava

Faculty: Faculty of Mathematics, Physics and Informatics

Course ID:	**Course title:**
FMFI.KAMŠ/1-EFM-270/15	Introduction to Game 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: 2

Recommended semester: 4.

Educational level: I.

Prerequisites:

Course requirements:
Homework, midterm test, final test, experiments.
Grade policy A 100-90%, B 89-80%, C 79-70%, D 69-60%, E 59-50%
Scale of assessment (preliminary/final): 100/0

Learning outcomes:
Students will be able to analyze correctly strategic situations, being able to make the right decisions

Class syllabus:
Strategic games with complete information. Dominance. Nash equilibrium. Applications (Cournot oligopoly, Bertrand oligopoly, voting games, deterrence wars, auctions). Nash equilibrium in mixed actions.
Extensive games with complete information. Associated game. Nash equilibrium, subgame perfect equilibrium.
Extensive games with perfect and imperfect information.

Recommended literature:
A Course in Game Theory / Martin J. Osborne, Ariel Rubinstein. Cambridge, Mass. : MIT Press, 1994
Extensive games with complete information. / Levent Kockesen and Efe A. Ok, New York University 2007
Game Theory: An Introduction, Steven Tadelis. Princeton University Press 2013

Languages necessary to complete the course:
Slovak, English

Notes:

Past grade distribution
Total number of evaluated students: 296

A	B	C	D	E	FX
38,85	26,01	21,62	8,78	3,04	1,69

Lecturers: doc. RNDr. Ján Pekár, PhD.
Last change: 15.06.2022
Approved by: doc. RNDr. Zuzana Chladná, Dr.

COURSE DESCRIPTION

Academic year: 2024/2025

University: Comenius University Bratislava

Faculty: Faculty of Mathematics, Physics and Informatics

Course ID:	**Course title:**
FMFI.KAMŠ/1-EFM-511/22	Introduction to University-level Mathematics (1)

Educational activities:
Type of activities: course
Number of hours:
per week: 4 **per level/semester:** 52
Form of the course: on-site learning

Number of credits: 3

Recommended semester: 1.

Educational level: I.

Prerequisites:

Course requirements:
Continuous assessment: warm-ups (1/3 of the assessment) and homework (2/3 of the assessment) during the semester. It is necessary to obtain at least 50% from each assignment.
Indicative assessment scale: A 90%, B 80%, C 70%, D 60%, E 50%
Scale of assessment (preliminary/final): 100/0

Learning outcomes:
Students will learn to formulate their own thoughts, argue and prove claims mathematically accurately orally and verbally. They will also consolidate and supplement the knowledge of high school mathematics needed in their further studies.

Class syllabus:
Classes give an introduction to logic, proof techniques and a variety of example problems that illustrate different aspects of mathematical proof. Particular emphasis is given to teaching fundamentals of how to communicate thoughts rigorously: both in an oral fashion and in a written form. Classes also enable students to consolidate their learning and mathematical background to help follow the Mathematical Analysis and Linear Algebra courses. Topics cover also algebraic expression, linear and quadratic function, real functions of one variable and their properties.

Recommended literature:
Kubáček, Z, Žabka, J: Seminár z matematiky, Zbierka úloh s riešeniami, 1. časť. , 2017.
Kubáček, Z, Žabka, J: Seminár z matematiky, Zbierka úloh s riešeniami, 2. časť., 2018.
P.J. Eccles An introduction to mathematical reasoning, Cambridge University Pres, 2007.
D. Solow, How to Read and Do Proofs, Wiley, 2014

Languages necessary to complete the course:
Slovak

Notes:

Past grade distribution Total number of evaluated students: 99					
A	B	C	D	E	FX
65,66	20,2	6,06	2,02	2,02	4,04
Lecturers: Mgr. Jana Szolgayová, PhD.					
Last change: 21.06.2022					
Approved by: doc. RNDr. Zuzana Chladná, Dr.					

COURSE DESCRIPTION

Academic year: 2024/2025

University: Comenius University Bratislava

Faculty: Faculty of Mathematics, Physics and Informatics

Course ID:	**Course title:**
FMFI.KAMŠ/1-EFM-512/22	Introduction to University-level Mathematics (2)

Educational activities:
Type of activities: course
Number of hours:
per week: 4 **per level/semester:** 52
Form of the course: on-site learning

Number of credits: 3

Recommended semester: 2.

Educational level: I.

Prerequisites:

Course requirements:
Continuous assessment: warm-ups (1/3 of the assessment) and homework (2/3 of the assessment) during the semester. It is necessary to obtain at least 50% from each assignment.
Indicative assessment scale: A 90%, B 80%, C 70%, D 60%, E 50%
Scale of assessment (preliminary/final): 100/0

Learning outcomes:
Students will learn to formulate their own thoughts, argue and prove claims mathematically accurately orally and verbally. They will also consolidate and supplement the knowledge of high school mathematics needed in their further studies.

Class syllabus:
Classes enable students to consolidate their learning and mathematical background to help follow the Mathematical Analysis and Linear Algebra courses. Particular emphasis is given to teaching fundamentals of how to communicate thoughts rigorously: both in an oral fashion and in a written form. Topics cover analytical geometry, curves of the second order, classification of the curves of the second order, equivalence relations, complex numbers and their properties, polar form of complex numbers, powers and roots of complex numbers

Recommended literature:
Kubáček, Z, Žabka, J: Seminár z matematiky, Zbierka úloh s riešeniami, 2. časť., 2018.
Kubáček, Z, Žabka, J: Seminár z matematiky, Zbierka úloh s riešeniami, 3. časť., 2020.
D.G. Zill, P.D. Shanahan Comlex analysis, Jones and Bartlett Publishers, 2003.
D. Solow, How to Read and Do Proofs, Wiley 2014.

Languages necessary to complete the course:
Slovak

Notes:

Past grade distribution Total number of evaluated students: 89					
A	B	C	D	E	FX
56,18	21,35	8,99	5,62	0,0	7,87
Lecturers: Mgr. Jana Szolgayová, PhD.					
Last change: 21.06.2022					
Approved by: doc. RNDr. Zuzana Chladná, Dr.					

COURSE DESCRIPTION

Academic year: 2024/2025

University: Comenius University Bratislava

Faculty: Faculty of Mathematics, Physics and Informatics

Course ID:	**Course title:**
FMFI.KAI/1-AIN-406/22	Language and Cognition

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: 3

Recommended semester: 2., 4., 6.

Educational level: I.

Prerequisites:

Course requirements:
Continuous assessment: presentations, bonus assignments
Indicative assessment scale: A 90%, B 80%, C 70%, D 60%, E 50%
Scale of assessment (preliminary/final): 100/0

Learning outcomes:
Acquisition of the most important current theories and methods of studying natural language and cognitive processes.

Class syllabus:
The course focuses on the most important aspects of natural language research (the most complex cognitive function): basic properties of language (arbitrariness, generative productivity, dynamism, structuring at many levels), mechanisms of speech production and perception, language acquisition, innate and acquired factors of language development.

Recommended literature:
G. Dorren: Babel. Around the World in 20 Languages. Profile Books, 2019
S. Pinker: Language Instinct. ſBrilliance Audio, 2014
S. Pinker: The Stuff of Thought. Language as a Window Into Human Nature. Penguin Books 2008
S. Pinker: Words and Rules. The lngredients of Language. Basic Books 2015

Languages necessary to complete the course:
Slovak, English

Notes:

Past grade distribution
Total number of evaluated students: 173

A	B	C	D	E	FX
37,57	23,7	15,03	10,98	5,2	7,51

Lecturers: doc. PhDr. Ján Rybár, PhD.

Last change: 17.05.2024
Approved by: doc. RNDr. Zuzana Chladná, Dr.

COURSE DESCRIPTION

Academic year: 2024/2025

University: Comenius University Bratislava

Faculty: Faculty of Mathematics, Physics and Informatics

Course ID:	**Course title:**
FMFI.KAMŠ/1-PMA-710/15	Legislation and Accountancy of Insurance Companies

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: 2.

Educational level: I.

Prerequisites:

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 student will master the basic concepts of insurance and the legislation regulating insurance in Slovakia. The student will know the basic accounting principles and reporting standards of insurance companies.

Class syllabus:
Basic concepts in insurance business. Origin and development of insurance in the world. Insurance market in Slovakia and in the European Union Acts (in their current and complete wording) regulating the insurance industry: Act on Insurance, Act on Compulsory Contractual Motor Vehicle Third Party Liability Insurance. Social and pension security in Slovakia. Solvency II. Dual Aspect Concept of accounting, Double Entry Accounting System, balance sheet, assets and liabilities, profit and loss statement, annual report. Concepts of synthetic and analytical accounts. Budgeting principles. Accounting documentation. Accounting and reporting standards in insurance sector; IFRS 17 and its impact on actuarial calculations, accounting processes and reporting techniques (calculation of the change in insurance contract liabilities and reporting the insurance company's profit).

Recommended literature:
Poisťovníctvo a účtovníctvo poisťovní / Jitka Meluchová. Bratislava : Iura Edition, 2004;
Účtovníctvo / Božena Soukupová, Anna Šlosárová, Anna Baštincová. Bratislava : Iura Edition, 2004;
Collection of Laws of the Slovak Republic;
study materials of the lecturer.

Languages necessary to complete the course:

Slovak, English

Notes:

Past grade distribution
Total number of evaluated students: 255

A	B	C	D	E	FX
49,8	15,69	11,76	10,59	3,53	8,63

Lecturers: Mgr. Gábor Szűcs, PhD.

Last change: 16.06.2022

Approved by: doc. RNDr. Zuzana Chladná, Dr.

COURSE DESCRIPTION

Academic year: 2024/2025

University: Comenius University Bratislava

Faculty: Faculty of Mathematics, Physics and Informatics

Course ID:	**Course title:**
FMFI.KAG/1-EFM-121/15	Linear Algebra and Geometry (1)

Educational activities:
Type of activities: lecture / practicals
Number of hours:
per week: 4 / 2 **per level/semester:** 52 / 26
Form of the course: on-site learning

Number of credits: 8

Recommended semester: 1.

Educational level: I.

Prerequisites:

Course requirements:
Work during the semester: 2 midterm exams (each 18%), homework (14%)
Final exam: written exam, oral exam (15 points needed to pass the written exam)
Approximate grade scheme: A 85%, B 75%, C 65%, D 55%, E 45%
Scale of assessment (preliminary/final): 50/50

Learning outcomes:
Upon completion of this course, students will master basic computational skills of linear algebra: solving linear systems, determining linear dependence / independence, determining spatial dimension, finding orthogonal complement, projection and projection matrix, finding a matrix of a linear mapping, calculating matrix determinants, determining whether a mapping is linear, finding the kernel and the image of a mapping.
Students will improve their skills in proving propositions and deducing the properties of mathematical objects and advance their argumentation in the language and the style of university mathematics.

Class syllabus:
Systems of linear equations and their geometry, Gaussian elimination, matrix representation, vectors, matrix operations, inverse matrix, vector spaces, linear dependence / independence, base, dimension, matrix rank, linear transformation, kernel, image, scalar product, orthogonality, projection, orthogonal complement, Gram-Schmidt orthogonalization, matrix determinant, Laplace's expantion, Cramer's rule, determinant as volume, permutations.

Recommended literature:
Linear algebra and its applications / Gilbert Strang. Belmont : Thomson Brooks/Cole, 2006
Lineárna algebra a geometria : Cesta z troch rozmerov s presahmi do príbuzných odborov / Pavol Zlatoš. Bratislava : Albert Marenčin, 2011; electronic version available at http://thales.doa.fmph.uniba.sk/zlatos/la/LAG_A4.pdf
Introduction to linear algebra / Gilbert Strang. Wellesley : Wellesley - Cambridge Press, 2009
Pěstujeme lineární algebru / Luboš Motl, Miloš Zahradník. Praha : Karolinum, 2002
Linear algebra done right / Sheldon Axler. New York : Springer, 1997

Languages necessary to complete the course:
English, Slovak

Notes:

Past grade distribution
Total number of evaluated students: 392

A	B	C	D	E	FX
4,34	10,46	17,35	21,94	27,04	18,88

Lecturers: Mgr. Martin Niepel, PhD., Mgr. Jakub Hrdina, PhD., Mgr. Samuel Kalužný

Last change: 12.03.2022

Approved by: doc. RNDr. Zuzana Chladná, Dr.

COURSE DESCRIPTION

Academic year: 2024/2025

University: Comenius University Bratislava

Faculty: Faculty of Mathematics, Physics and Informatics

Course ID:	**Course title:**
FMFI.KAG/1-EFM-160/12	Linear Algebra and Geometry (2)

Educational activities:
Type of activities: lecture / practicals
Number of hours:
per week: 3 / 2 **per level/semester:** 39 / 26
Form of the course: on-site learning

Number of credits: 7

Recommended semester: 2.

Educational level: I.

Prerequisites:

Recommended prerequisites:
Linear Algebra and Geometry I. (1-EFM-121) or equivalent course.

Course requirements:
Work during the semester: 2 midterm exams (each 18%), homework (14%)
Final exam: written exam, oral exam (15 points needed to pass the written exam)
Approximate grade scheme: A 85%, B 75%, C 65%, D 55%, E 45%
Scale of assessment (preliminary/final): 50/50

Learning outcomes:
Upon completion of this course students will master the more advanced computational skills of linear algebra: finding eigenvalues and eigenvectors of a matrix, diagonalization of a matrix and finding its exponential, finding the minimum polynomial of a matrix, the generalized eigenvectors, deciding whether two matrices are similar, finding the Jordan canonical form, quadratic forms, describing a conic corresponding to a quadratic form.
Students will improve their skills in proving propositions and deducing the properties of mathematical objects and advance their argumentation in the language and the style of university mathematics.

Class syllabus:
Eigenvectors, eigenvalues, characteristic polynomial, applications of matrix diagonalization to difference and differential equations, Schur's lemma, minimal polynomial, Jordan Form, quadratic forms, Sylvester's criterion, Sylvester's law of inertia, conics.

Recommended literature:
Linear algebra and its applications / Gilbert Strang. Belmont : Thomson Brooks/Cole, 2006
Lineárna algebra a geometria : Cesta z troch rozmerov s presahmi do príbuzných odborov / Pavol Zlatoš. Bratislava : Albert Marenčin, 2011; electronic version available at http://thales.doa.fmph.uniba.sk/zlatos/la/LAG_A4.pdf
Introduction to linear algebra / Gilbert Strang. Wellesley : Wellesley - Cambridge Press, 2009
Pěstujeme lineární algebru / Luboš Motl, Miloš Zahradník. Praha : Karolinum, 2002
Linear algebra done right / Sheldon Axler. New York : Springer, 1997

Languages necessary to complete the course:
English, Slovak

Notes:

Past grade distribution
Total number of evaluated students: 462

A	B	C	D	E	FX
8,23	16,88	22,08	22,94	22,73	7,14

Lecturers: Mgr. Martin Niepel, PhD., Mgr. Jakub Hrdina, PhD.

Last change: 12.03.2022

Approved by: doc. RNDr. Zuzana Chladná, Dr.

COURSE DESCRIPTION

Academic year: 2024/2025

University: Comenius University Bratislava

Faculty: Faculty of Mathematics, Physics and Informatics

Course ID:	**Course title:**
FMFI.KAMŠ/1-EFM-220/00	Linear Programming

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.

Prerequisites: (FMFI.KAG/1-MAT-160/15 - Linear Algebra and Geometry (2) or FMFI.KAG/1-EFM-160/12 - Linear Algebra and Geometry (2) or FMFI.KAG/1-DAV-104/20 - Linear Algebra) and (FMFI.KAMŠ/1-EFM-130/00 - Mathematical Analysis (2) or FMFI.KAMŠ/1-DAV-102/20 - Calculus (1))

Course requirements:
Continuous assessment: exercises: 20%, project: 20%, Exam: 60%.
The student must obtain at least half of the points for the exercises in order to pass the final written exam.
Grading: A (100-91), B (90-81), C (80-71), D (70-61), E (60-51), Fx (50-0).
Scale of assessment (preliminary/final): 40% / 60%

Learning outcomes:
Student master the basics of linear programming (simple models of real problems, relevant geometry, duality theory and some of simplex methods, the idea of interior point methods). They are able to prove the statements. At the same time, they will gain an overview of possible applications of linear programming in other scientific fields, or in practice.

Class syllabus:
Geometric approach to solving linear programming problems. Practical problems formulation in the form of LP. Fundamentals of convex analysis (convex set, polyhedrons, extreme points, separation theorems, theorems of alternatives). Basic solutions and connection with extreme points. Simplex method (basic idea, two-phase and dual simplex method). Duality theory (duality and complementarity theorems) and its applications and economic interpretation. Basic idea of interior point methods for linear programming, central path. Modern applications of linear programming.

Recommended literature:
Mária Trnovská: Lineárne programovanie, online text.
Lineárne programovanie / Ján Plesník, Jitka Dupačová, Milan Vlach. Bratislava : Alfa, 1990
Robert J. Vanderbei: Linear programming: Foundations and extensions, Kluwer Academic Publishers, 2000.

Languages necessary to complete the course:
Slovak, English

Notes:

Past grade distribution
Total number of evaluated students: 825

A	B	C	D	E	FX
19,39	19,64	22,91	21,21	15,27	1,58

Lecturers: doc. RNDr. Mária Trnovská, PhD., Mgr. Bernadett Bertóková

Last change: 14.07.2025

Approved by: doc. RNDr. Zuzana Chladná, Dr.

COURSE DESCRIPTION

Academic year: 2024/2025

University: Comenius University Bratislava

Faculty: Faculty of Mathematics, Physics and Informatics

Course ID:	**Course title:**
FMFI.KAMŠ/1-EFM-390/00	Macroeconomics

Educational activities:
Type of activities: lecture
Number of hours:
per week: 4 **per level/semester:** 52
Form of the course: on-site learning

Number of credits: 5

Recommended semester: 6.

Educational level: I.

Prerequisites: FMFI.KAMŠ/1-EFM-140/17 - Economics (2)

Course requirements:
Examination: Final test: A 88%, B 78%, C 68%, D 58%, E 48%
Scale of assessment (preliminary/final): 0/100

Learning outcomes:
Students will understand the current macroeconomic theory in relation to its use in the real policy of central banks and governments.

Class syllabus:
Aggregated demand, aggregate supply, business cycles. Inflation, unemployment, monetary policy of the central bank. Labor markets and policies of the economic side. Monetary policy of the central bank. Government fiscal policy. Theory of private consumption and investment. Money and financial markets. Open economy in the short term. Inflation and Unemployment in an Open Economy. Shocks and responses of the government and the central bank.

Recommended literature:
O. Blanchard. S. Fischer: Lectures on Macroeconomics
D. Romer: Advanced Macroeconomics

Languages necessary to complete the course:
Slovak, English

Notes:

Past grade distribution
Total number of evaluated students: 657

A	B	C	D	E	FX
28,16	24,81	24,66	14,76	6,85	0,76

Lecturers: doc. RNDr. Ján Boďa, CSc.

Last change: 09.03.2022

Approved by: doc. RNDr. Zuzana Chladná, Dr.

COURSE DESCRIPTION

Academic year: 2024/2025

University: Comenius University Bratislava

Faculty: Faculty of Mathematics, Physics and Informatics

Course ID:	**Course title:**
FMFI.KAMŠ/1-EFM-110/00	Mathematical Analysis (1)

Educational activities:
Type of activities: lecture / practicals
Number of hours:
per week: 4 / 2 **per level/semester:** 52 / 26
Form of the course: on-site learning

Number of credits: 8

Recommended semester: 1.

Educational level: I.

Prerequisites:

Course requirements:
Continuous assessment: 4 written examinations during the semester, 10 points each, homework evaluated twice per semester, active participation in seminars
Examination: written and oral examination
Indicative assessment scale: A 92%, B 84%, C 76%, D 68%, E 60%
Scale of assessment (preliminary/final): 60/40

Learning outcomes:
After completing the course, students will master the basics of mathematical analysis of the functions of one real variable. Thus, they will be able to investigate the course of a function, calculate the limits and derivatives of functions of one variable.

Class syllabus:
I. Introduction
II. The Real and Complex Number Systems
Ordered Sets, Fields, The Real Field, The Extended Real Number System, The Complex Field.
III. Basic Topology
Finite, Countable, and Uncountable Sets, Compact Sets.
IV. Numerical Sequences and Series
Convergent Sequences, Subsequences, Cauchy Sequences, Upper and Lower Limits, Some Special Sequences, Series, Series of Nonnegative Terms, The Number e, The Root and Ratio Test, Power Series, Absolute Convergence, Addition and Multiplication of Series, Elementary Functions.
V. Continuity
Limits of Functions, Continuous Functions, Continuity and Compactness, Dicontinuities, Monotonic Functions, Infinite Limits and Limits at Infinity.

Recommended literature:
Rudin, Walter: Principles of mathematical analysis, ISBN 0-07-054235-X
Hildebrandt, Stefan: Analysis I, ISBN 3-540-42838-0
Forstter, Otto: Analysis I, ISBN 3-528-57224-8
Neubrunn, Tibor a Vencko, Jozef: Mathematical Analysis I, textbook of FMFI UK

Kubáček, Valášek: Cvičenia z Matematickej analýzy 1,2

Languages necessary to complete the course:
Slovak and English

Notes:

Past grade distribution
Total number of evaluated students: 646

A	B	C	D	E	FX
21,36	23,07	25,85	15,48	6,04	8,2

Lecturers: Mgr. Martin Kollár, PhD., RNDr. Ľubica Kossaczká, CSc.

Last change: 12.03.2022

Approved by: doc. RNDr. Zuzana Chladná, Dr.

COURSE DESCRIPTION

Academic year: 2024/2025

University: Comenius University Bratislava

Faculty: Faculty of Mathematics, Physics and Informatics

Course ID:	**Course title:**
FMFI.KAMŠ/1-EFM-130/00	Mathematical Analysis (2)

Educational activities:
Type of activities: lecture / practicals
Number of hours:
per week: 4 / 2 **per level/semester:** 52 / 26
Form of the course: on-site learning

Number of credits: 8

Recommended semester: 2.

Educational level: I.

Prerequisites:

Course requirements:
Continuous assessment: 4 written examinations during the semester, 10 points each, homework evaluated twice per semester, active participation in seminars
Examination: written and oral examination
Indicative assessment scale: A 92%, B 84%, C 76%, D 68%, E 60%
Scale of assessment (preliminary/final): 60/40

Learning outcomes:
After completing the course, students will master the basics of the integral number of functions of one real variable. Thus, to determine the primitive function, to compute certain integrals of the functions of one variable, to investigate the convergence of the series.

Class syllabus:
VI. Differentiation
The Derivative of a Real Function, Mean Value Theorems, The Continuity of Derivatives, L'Hospital's Rule, Derivatives of Higher Order, Taylor's Theorem,
VII. The Riemann Integral
Definition and Existence of the Integral, Properties of the Integral, Integration and Differentiation, Rectifiable Curves.
VIII. Sequences and Series of Functions
Discussion of Main Problem, Uniform Convergence, Uniform Convergence and Continuity, Uniform Convergence and Integration, Uniform Convergence and Differentiation, Power Series.

Recommended literature:
Rudin, Walter: Principles of mathematical analysis, ISBN 0-07-054235-X
Hildebrandt, Stefan: Analysis I, ISBN 3-540-42838-0
Forstter, Otto: Analysis I, ISBN 3-528-57224-8
Neubrunn, Tibor a Vencko, Jozef: Mathematical Analysis I, textbook of FMFI UK
Kubáček, Valášek: Cvičenia z Matematickej analýzy 1, 2

Languages necessary to complete the course:
Slovak and English

Notes:

Past grade distribution
Total number of evaluated students: 579

A	B	C	D	E	FX
30,4	26,77	19,0	14,16	6,04	3,63

Lecturers: Mgr. Martin Kollár, PhD., RNDr. Ľubica Kossaczká, CSc.

Last change: 12.03.2022

Approved by: doc. RNDr. Zuzana Chladná, Dr.

COURSE DESCRIPTION

Academic year: 2024/2025

University: Comenius University Bratislava

Faculty: Faculty of Mathematics, Physics and Informatics

Course ID:	**Course title:**
FMFI.KAMŠ/1-EFM-210/00	Mathematical Analysis (3)

Educational activities:
Type of activities: lecture / practicals
Number of hours:
per week: 4 / 2 **per level/semester:** 52 / 26
Form of the course: on-site learning

Number of credits: 8

Recommended semester: 3.

Educational level: I.

Prerequisites: ((FMFI.KAMŠ/1-EFM-110/00 - Mathematical Analysis (1) and FMFI.KAMŠ/1-EFM-130/00 - Mathematical Analysis (2)) or (FMFI.KMANM/1-MAT-110/00 - Mathematical Analysis (1) and FMFI.KMANM/1-MAT-150/00 - Mathematical Analysis (2))) and (FMFI.KAG/1-EFM-160/12 - Linear Algebra and Geometry (2) or FMFI.KAG/1-MAT-160/15 - Linear Algebra and Geometry (2))

Course requirements:
Continuous assessment: 2 tests, evaluation of oral presentations
Examination: written and oral examination
Indicative assessment scale: A 90%, B 80%, C 70%, D 60%, E 50%
Scale of assessment (preliminary/final): 40/60

Learning outcomes:
To master the basics of the differential calculus of functions of several variables with emphasis on the methods used in the economic sciences. Upon completion of the course, students will acquire key competences in the field of vector mathematical analysis and finite-optimization methods.

Class syllabus:
Class syllabus:
Topic 1: Normed vector spaces (NVS).
• Norm and its properties.
• Equivalent norms.
• Examples of norms in general NVS.
• Euclidean space. Scalar product.
• Cauchy-Schwartz inequality, Young's and Minkowski inequality.
• Linear mappings and functionalities.
Topic 2: Topological properties of NVS.
• Open and closed sets in a NVS.
• Boundary of a set.
• Convergence of sequences in NVS.
• Compact sets, criteria for compactness, Heine-Borel theorem.
• Complete normed spaces, Banach and Hilbert space.
• Completions of a normed space.

• Lebesgue space.
• Contiguous set.
• Convex set in the NVS.
Topic 3: Continuity in NVS.
• Limits of functions. The definition of continuity of a function in NVS.
• Extremal properties of continuous functions on compact and contiguous subsets.
• Contractive mapping and Banach theorem on the existence of a fixed point and its applications
Topic 4: Multivariate functions.
• Relationship between multiple limit and limits of functions of more variables.
• Graph over a function of several variables.
• Convex and concave function.
• Level sets of convex functions.
Topic 5: Differentiability of functions of several variables.
• Partial derivatives of functions of several variables and their geometric interpretation.
• Partial derivatives of higher order, interchangeability of the order of differentiation.
• The derivative of a multivariate function and its geometrical interpretation.
• Relationship between derivative of a function and its partial derivatives, Jacobi matrix.
• Derivative of a composite function. Derivatives of higher order.
Topic 6: Properties of differentiable functions.
• Taylor series for multivariate function.
• Differential of a function and its use to determine the approximate value of a function.
• Gradient of a function and directional derivatives.
• Relationship between gradient and level set of a differentiable function.
• Convexity criterion for functions of several variables.
Topic 7: Extremal properties of multivariate functions.
• Tangent plane to a graph of a functions.
• Maximum and minimum of a multivariate function, local extremes. Saddle points.
• Necessary conditions for local extremes of functions of several variables.
• Sufficient conditions for local extremes and Hessian matrix of second derivatives.
• Global extremes and methods for their determination.
• Applications that lead to finding extremes of unconstrained functions.
Topic 8: Functions given implicitly.
• Examples of importance of implicit functions.
• The existence of an implicit function.
• Derivative of implicit function.
• Existence of an inverse function.
Topic 9: Extremes of a constrained multivariate function.
• Importance and application of extremes of a constrained multivariate function.
• Geometric interpretation of the extreme of a constrained multivariate function and Lagrange multipliers.
• Lagrangian.
• Necessary conditions for the existence of an extreme of a constrained function.
• Methods for determining the extreme type, some simple sufficient conditions for finding constrained minimum/maximum.
• General sufficient condition for an extreme of a constrained function and bounded Hessian.

Recommended literature:

Online zbierka príkladov a úloh a základov teórie:
Martin Kollár, Ľubica Kossaczká, Daniel Ševčovič: Diferenciálny a integrálny počet funkcií viac premenných v príkladoch

Knižničné a edičné centrum FMFI UK, 192 pp. (in Slovak). ISBN: 978-80-89186-54-9
http://www.iam.fmph.uniba.sk/institute/sevcovic/knihy/
BARNOVSKÁ M., SMÍTALOVÁ K.: (1991) Matematická analýza III, Skriptá UK, Bratislava.
BARNOVSKÁ M., SMÍTALOVÁ K.: (1984) Matematická analýza IV, Skriptá UK, Bratislava.
KLUVÁNEK, I., MIšÍK, L., ŠVEC M.: (1961) Matematika I, II, SVTL Bratislava.
DEMIDOVIČ, B.P.: (1977) Sbornik zadač i upražnenij po matematičeskomu analizu, Moskva Nauka (v ruštine).

Languages necessary to complete the course:
Slovak and English

Notes:

Past grade distribution
Total number of evaluated students: 801

A	B	C	D	E	FX
29,96	30,34	25,09	9,36	4,62	0,62

Lecturers: prof. RNDr. Daniel Ševčovič, DrSc., RNDr. Ľubica Kossaczká, CSc., Mgr. Martin Kollár, PhD.

Last change: 12.03.2022

Approved by: doc. RNDr. Zuzana Chladná, Dr.

COURSE DESCRIPTION

Academic year: 2024/2025

University: Comenius University Bratislava

Faculty: Faculty of Mathematics, Physics and Informatics

Course ID:	**Course title:**
FMFI.KAMŠ/1-EFM-250/00	Mathematical Analysis (4)

Educational activities:
Type of activities: lecture / practicals
Number of hours:
per week: 4 / 2 **per level/semester:** 52 / 26
Form of the course: on-site learning

Number of credits: 8

Recommended semester: 4.

Educational level: I.

Prerequisites: (FMFI.KAMŠ/1-EFM-130/00 - Mathematical Analysis (2) or FMFI.KMANM/1-MAT-150/00 - Mathematical Analysis (2)) and FMFI.KAMŠ/1-EFM-210/00 - Mathematical Analysis (3)

Course requirements:
Continuous assessment: 2 written tests, evaluation of oral presentations
Examination: written and oral examination
Indicative assessment scale: A 90%, B 80%, C 70%, D 60%, E 50%
Scale of assessment (preliminary/final): 40/60

Learning outcomes:
To master the basics of the integral calculus of functions of multiple variables, with emphasis on the methods used in financial mathematics. Upon completion of the course students will acquire key competences in the field of vector mathematical analysis.

Class syllabus:
Class syllabus:
Topic 1: Fourier series.
• Decomposition of a function into Fourier series.
• Formulas for the Fourier coefficients
• Complex form of trigonometric series.
• Periodic extension of a functions.
• Pointwise convergence of Fourier series. Fejer kernel.
• Bessel inequality and Parseval equality.
• Odd and even extentions of functions and their decomposition into Fourier series.
• Applications of the Fourier series.
• Solution to the boundary value problem for ordinary differential equations using Fourier series.
Topic 2: Parametric integrals.
• Definition of a parametric integral.
• Examples of parametric integrals.
• Continuity and differentiability of parametric integrals.
• Parametric integrals of unbounded functions.
• Parametric integrals on unbounded intervals.

• Method of calculation for parametric integrals.
• Gamma, Beta functions and their properties.
Topic 3: Riemann integral of multivariate function.
• Riemann integral on a bounded area.
• Properties of the integral of a multivariate function.
• Fubini theorem.
Topic 4: Substitution method for integrating functions of several variables.
• Linear and non-linear coordinate transformation.
• Jacobi matrix of a transformation and the geometric interpretation of its determinant.
• Substitution theorem for integrals of multivariate functions.
• Polar and spherical coordinates.
• Method of calculation of multidimensional integrals by transformation of variables.
Topic 5: Curve and surface integrals.
• Integrating functions defined on curves.
• Curve integral: kind I. and II..
• Integrating functions defined on surfaces.
• Surface integrals.
• Relationship between, curve, surface and volume integrals.
• Green's formula of integration by parts.
• Ostrogradskij-Gauss theorem and Stokes formula.

Recommended literature:

M. Barnovská, K. Smítalová, Matematická analýza IV, Skriptum UK v Bratislave, 1984.
V. Ďurikovič, Mat. Analýza 4, Integrálny počet v R^n, UK, 1997.
Online zbierka príkladov a úloh a základov teórie:
Martin Kollár, Ľubica Kossaczká, Daniel Ševčovič: Diferenciálny a integrálny počet funkcií viac premenných v príkladoch
Knižničné a edičné centrum FMFI UK, 192 pp. (in Slovak). ISBN: 978-80-89186-54-9
http://www.iam.fmph.uniba.sk/institute/sevcovic/knihy/
BARNOVSKÁ M., SMÍTALOVÁ K.: (1991) Matematická analýza III, Skriptá UK, Bratislava.
BARNOVSKÁ M., SMÍTALOVÁ K.: (1984) Matematická analýza IV, Skriptá UK, Bratislava.
KLUVÁNEK, I., MIšÍK, L., ŠVEC M.: (1961) Matematika I, II, SVTL Bratislava.
DEMIDOVIČ, B.P.: (1977) Sbornik zadač i upražnenij po matematičeskomu analizu, Moskva Nauka (v ruštine).

Languages necessary to complete the course:
Slovak and English

Notes:

Past grade distribution
Total number of evaluated students: 796

A	B	C	D	E	FX
39,32	32,16	16,33	8,04	3,27	0,88

Lecturers: prof. RNDr. Daniel Ševčovič, DrSc., Mgr. Martin Kollár, PhD., RNDr. Ľubica Kossaczká, CSc.

Last change: 12.03.2022

Approved by: doc. RNDr. Zuzana Chladná, Dr.

COURSE DESCRIPTION

Academic year: 2024/2025

University: Comenius University Bratislava

Faculty: Faculty of Mathematics, Physics and Informatics

Course ID:	**Course title:**
FMFI.KAMŠ/1-EFM-510/00	Mathematical Analysis Classes (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.

Educational level: I.

Prerequisites:

Course requirements:
Continuous assessment: 2 tests of 10 points, active participation in seminars, homework checked twice a semester
Scale of assessment (preliminary/final): 100/0

Learning outcomes:
After completing the course, students will master the basics of mathematical analysis of the functions of one real variable. Thus, investigate the course of the function, calculate the limits and derivatives of functions of one variable.

Class syllabus:
I. Introduction: 1. Basic concept of sets and logic, function, relations. 2. Definition of real numbers, supremum of a bounded set.
II. Sequences: 1. Limit of a sequence, limes superior a inferior, limit point. 2. Relationship between convergence and boudedness, Cantor set, Bolzano-Cauchy criterion.
III. One variable functions: 1. Limit of a function, continuous functions, basic theorems of limits, Heine definition of limit, uniform continuity. 2. Differential calculus, mean value theorems, monotonic functions, local maxima and minima, convex functions, asymptotic behaviour, Taylor polynomial.

Recommended literature:
Kubáček, Valášek: Cvičenia z matematickej analýzy I

Languages necessary to complete the course:
Slovak and English

Notes:

Past grade distribution
Total number of evaluated students: 850

A	B	C	D	E	FX
52,12	20,71	11,76	7,18	6,24	2,0

Lecturers: RNDr. Ľubica Kossaczká, CSc., Mgr. Martin Kollár, PhD.
Last change: 12.03.2022
Approved by: doc. RNDr. Zuzana Chladná, Dr.

COURSE DESCRIPTION

Academic year: 2024/2025

University: Comenius University Bratislava

Faculty: Faculty of Mathematics, Physics and Informatics

Course ID:	**Course title:**
FMFI.KAMŠ/1-EFM-520/00	Mathematical Analysis Classes (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.

Educational level: I.

Prerequisites:

Course requirements:
Continuous assessment: 2 tests of 10 points each, active participation in classes, homework checked twice a semester
Indicative assessment scale: A 92%, B 84%, C 76%, D 68%, E 60%
Scale of assessment (preliminary/final): 100/0

Learning outcomes:
After completing the course, students will master the basics of the integral number of functions of one real variable. Thus, to determine the primitive function, to compute certain integrals of the functions of one variable, to investigate the convergence of the series.

Class syllabus:
I. Functional sequences and series: 1. Sequences of functions, point and uniform convergence. 2. Numbers and functions series, convergence criterions, power expansions. 3. Taylor series of the functions.
II. Integral calculus: 1. Primitive function, Newton integral, integration by parts and substitution methods, reduction to the parial fractions. 2. Riemann integral, integrability of monotonic and continuous functions, mean value theorems, Newton-Leibniz formula, applications of integral (area of planar regions, lehght of a curve, volume and surface area of solids). 3. Functions with bounded variation, Riemann-Stieltjes integral.

Recommended literature:
Kubáček, Valášek: Cvičenia z matematickej analýzy II

Languages necessary to complete the course:
Slovak and English

Notes:

Past grade distribution Total number of evaluated students: 771					
A	B	C	D	E	FX
60,18	14,4	10,38	7,91	5,97	1,17
Lecturers: Mgr. Martin Kollár, PhD., RNDr. Ľubica Kossaczká, CSc.					
Last change: 12.03.2022					
Approved by: doc. RNDr. Zuzana Chladná, Dr.					

COURSE DESCRIPTION

Academic year: 2024/2025

University: Comenius University Bratislava

Faculty: Faculty of Mathematics, Physics and Informatics

Course ID:	**Course title:**
FMFI.KAMŠ/1-EFM-530/00	Mathematical Analysis Classes (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.

Educational level: I.

Prerequisites:

Course requirements:
Continuous assessment: 3 written exams, class activity
Indicative assessment scale: A 92%, B 84%, C 76%, D 68%, E 60%
Scale of assessment (preliminary/final): 100/0

Learning outcomes:
After completing the course, students will master the basics of differential calculus of functions of several real variables. They will be able to determine local and bound local extremes of functions of several real variables.

Class syllabus:
Metric spaces. Limit and continuity of a multivariable function. Differentiation of _ mappings, total differential and total derivative. Partial derivative, Taylor formula. Local and global extrema of multivariable function. Implicit functions.

Recommended literature:
Zbierka úloh z vyššej matematiky : 3. časť / Jozef Eliaš, Ján Horváth, Juraj Kajan. Bratislava : Slovenské vydavateľstvo technickej literatúry, 1967
Sbornik zadač i upražnenij po matematičeskomu analizu / B. P. Demidovič. Moskva : Fizmatgiz, 1963
Martin Kollár, Ľubica Kossaczká, Daniel Ševčovič Diferenciálny a integrálny počet funkcií viac premenných v príkladoch Knižničné a edičné centrum FMFI UK, 192 pp. (in Slovak). ISBN: 978-80-89186-54-9
M. Barnovská, K. Smítalová, Matematická analýza III, Skriptum UK v Bratislave, 1983

Languages necessary to complete the course:
Slovak and English

Notes:

Past grade distribution
Total number of evaluated students: 797

A	B	C	D	E	FX
47,3	21,96	17,82	7,03	5,77	0,13

Lecturers: Mgr. Martin Kollár, PhD., RNDr. Ľubica Kossaczká, CSc.

Last change: 12.03.2022

Approved by: doc. RNDr. Zuzana Chladná, Dr.

COURSE DESCRIPTION

Academic year: 2024/2025

University: Comenius University Bratislava

Faculty: Faculty of Mathematics, Physics and Informatics

Course ID:	**Course title:**
FMFI.KAMŠ/1-EFM-540/00	Mathematical Analysis Classes (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.

Educational level: I.

Prerequisites:

Course requirements:
Continuous assessment: 2 written exams, class activity
Indicative assessment scale: A 92%, B 84%, C 76%, D 68%, E 60%
Scale of assessment (preliminary/final): 100/0

Learning outcomes:
After completing the course, students will master the basics of the integral number of functions of several real variables. They will be able to compute multidimensional definite integrals and curve integrals.

Class syllabus:
Multiple integrals. Line and surface integrals, Green's formula, Ostrogradskij and Stokes theorem. Parametric integrals. Fourier series.

Recommended literature:
Zbierka úloh z vyššej matematiky : 4. časť / Jozef Eliaš ... [et al.]. Bratislava : Alfa, 1979
Sbornik zadač i upražnenij po matematičeskomu analizu / B. P. Demidovič. Moskva : Fizmatgiz, 1963
Martin Kollár, Ľubica Kossaczká, Daniel Ševčovič Diferenciálny a integrálny počet funkcií viac premenných v príkladoch Knižničné a edičné centrum FMFI UK, 192 pp. (in Slovak). ISBN: 978-80-89186-54-9
M. Barnovská, K. Smítalová, Matematická analýza IV, Skriptum UK v Bratislave, 1984.
Eliaš J., Horváth J., Kajan J., Zbierka úloh z vyššej matematiky, 4. časť, Bratislava, Alfa, 1972.

Languages necessary to complete the course:
Slovak and English

Notes:

Past grade distribution Total number of evaluated students: 786					
A	B	C	D	E	FX
53,18	20,87	13,61	8,14	3,94	0,25
Lecturers: Mgr. Martin Kollár, PhD., RNDr. Ľubica Kossaczká, CSc.					
Last change: 12.03.2022					
Approved by: doc. RNDr. Zuzana Chladná, Dr.					

STATE EXAM DESCRIPTION

Academic year: 2024/2025	
University: Comenius University Bratislava	
Faculty: Faculty of Mathematics, Physics and Informatics	
Course ID: FMFI.KAMŠ/1-EFM-961/15	**Course title:** Mathematical Methods
Number of credits: 2	
Educational level: I.	

Course requirements:

Examination: written and oral in front of the state commission
Scale of assessment (preliminary/final): 0/100

Learning outcomes:

The result will be the completion of the final state exam in the subject: Mathematical Methods. This means that the student demonstrates an understanding of the basics of each subject in the subject syllabus in their interdisciplinary contexts.

Class syllabus:

1. Linear programming

Convex analysis of sets: convex sets and their properties, extreme points of convex sets, supporting hyperplane theorem, theorems on the separation of convex sets, Farkas' lemma.

Simplex method: Geometric idea. Simplex table and algorithm. Two-phase simplex method. Finite simplex method, anticyclic method. Dual simplex method.

Duality theory: General form of a dual problem. Weak theorem about duality and its consequences. Strong duality theorem. Complementarity theorem. optimality verification.

2. Nonlinear programming and free optimization methods

Optimization methods (Overview and basic principles): Minimization of the function of one variable (interval approximation methods and interpolation methods). Minimization of the function of n-variables (gradient method, cyclic coordinate reduction method, Newton's method, combined gradients method and quasi-Newtonian methods).

The concept of Lagrange function, the vector of Lagrange multipliers, the relation of the optimal solution and the associated vector of multipliers with the saddle point of the Lagrange function, nonlinear programming methods using the Lagrange function, generalizations of the Lagrange function, Lagrange's dual problem.

Necessary conditions of optimality: Lagrange's theorem and theorem on sensitivity for the classical problem to a bounded extreme. Kuhn-Tucker theorem for mathematical programming problem (with mixed boundary type), construction of Kuhn-Tucker conditions for general problems.

Overview of basic types of extremes and saddle points. Existence theorems for extreme and saddle point type "minmax". General principle of duality in extremal problems: General concept of dual problem. (Application of Roode's theorem and the "minmax" theorem.)

Convex analysis of functions: definition of convexity, conditions of the 1st and 2nd order of convexity, convexity criteria, operations preserving convexity, quasi-convex functions, strongly convex functions.

Convex programming: Kuhn-Tucker theorem for the convex programming problem. Weak and strong duality theorem. Wolfe's dual problem, Slater's condition and Slater's theorem.

3. Selected chapters of economic theory

Basic macroeconomic variables: gross domestic product, unemployment rate, inflation rate. Commodity market. Aggregate demand and its composition. Equilibrium output of the economy. Commodity market dynamics. Financial markets. Money and bonds. Demand for money, money supply and equilibrium interest rate. The role of the central bank and commercial banks. IS-LM model, balance of goods and financial markets. Fiscal and monetary policy. Expectations and macroeconomic policy. Commodity market in an open economy. Equilibrium output and trade balance. IS-LM model in the case of open economy. Exchange rates. The effectiveness of macroeconomic policy.
Labor market. Wage and pricing. Natural unemployment rate. Aggregate demand and aggregate supply. Inefficiency of monetary policy in the long run. The effectiveness of fiscal policy. Changes in the natural rate of unemployment. Philips curve. Inflation, expected inflation and unemployment. Economic growth. Saving, capital accumulation and economic output. Technological progress and growth.
Consumer: Preferences and utility function. Consumer balance. Marshall and Hicks demand function: Slutsky's equation.
Company: Technological set and production function. Company balance and cost function.
Equilibrium in a sub-market in perfect competition: Short-term equilibrium and equilibrium with free market entry. Impact of taxes and subsidies. Consumers and producers surplus.
Imperfect competition: The balance of the monopoly and its inefficiency. Cournot's equilibrium oligopoly. Cartel instability.
Equilibrium of the complete market: Walras 'law, Walras' equilibrium and its Pareto optimality. Externalities and property rights.
4. Financial mathematics
Interest rates: Coupon and zero-coupon bonds. Time structure of interest rates. Construction of the time structure of interest rates using bond market prices (bootstrapping). Net present value. Yield to maturity. Forward interest rates. Duration and change in the value of the bond portfolio with a parallel shift in interest rates.
Portfolio theory: Utility function, risk aversion, optimal portfolio selection by maximizing the mean value of the utility function. Markowitz model. Risk minimization with fixed return, optimization of the portfolio containing risk-free securities, market price of risk. Capital Asset Pricing Model as Equilibrium Model, Capital Market Line, Security Market Line.
Fundamentals of derivative valuation theory: Binomial tree model, calculation of risk-neutral probabilities and values of derivatives based on them. Self-financed strategies and derivatives replication.
5. Statistical methods and econometrics
Properties of diameter and selective dispersion. Student's t-tests and F-test of dispersion equality. Confidence intervals for mean and dispersion. UMP-tests and the Neyman-Pearson lemma. Estimates of BUE and Cramér-Ra inequality. MLE estimation properties. Wald's test

State exam syllabus:

Recommended literature:

1. J. Plesník, J. Dupacova, M. Vlach: Lineárne programovanie. Alfa, Bratislava 1990
2. M. Hamala, M. Trnovská: Nelineárne programovanie, EPOS, Bratislava 2013.
3. P. A. Samuelson, W. D. Nordhaus: Ekonómia I, II. Bradlo, Bratislava 1992;
B. Felderer, S. Homburg: Makroekonomika a nová makroekonomika. Elita, Bratislava, 1995.
P. Brunovský: Mikroekonómia, učebný text (http://www.iam.fmph.uniba.sk/skripta/brunovsky2)
4. I. Melicherčík, L. Olšarová, V. Úradníček: Kapitoly z finančnej matematiky, EPOS, Bratislava 2005
5. G. Casella a R. L. Berger: Statistical inference (2nd edition). Cengane Learning, 2001.

J. Johnston, J. DiNardo: Econometric Methods. McGraw-Hill, 1997.

Languages necessary to complete the course:
Slovak, English

Last change: 09.03.2022

Approved by: doc. RNDr. Zuzana Chladná, Dr.

COURSE DESCRIPTION

Academic year: 2024/2025

University: Comenius University Bratislava

Faculty: Faculty of Mathematics, Physics and Informatics

Course ID:	**Course title:**
FMFI.KAMŠ/1-EFM-565/15	Mathematical Software

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: 3.

Educational level: I.

Prerequisites:

Course requirements:
Continuous assessment: warm-ups (1/3 of the assessment) and projects (2/3 of the assessment) during the semester. It is necessary to obtain at least 50% from warm-ups and each project.
Indicative assessment scale: A 90%, B 80%, C 70%, D 60%, E 50%
Scale of assessment (preliminary/final): 100/0

Learning outcomes:
Following the courses Programming (1) and (2) students learn the basics of numeric computing relevant for their specialization and master writing scientific texts in LaTeX.

Class syllabus:
1. Vectors, matrices
2. Data import and export
3. Visualization - plotting functions
4. Systems of Nonlinear Equations
5. Optimization (linear and nonlinear)
6. LaTex - scientific text writing, mathematical formulas, tables, images

Recommended literature:

Languages necessary to complete the course:
Slovak, English

Notes:

Past grade distribution
Total number of evaluated students: 296

A	B	C	D	E	FX
49,66	25,0	12,5	8,11	4,39	0,34

Lecturers: Mgr. Jana Szolgayová, PhD.

Last change: 21.06.2022

Approved by: doc. RNDr. Zuzana Chladná, Dr.

STATE EXAM DESCRIPTION

Academic year: 2024/2025	
University: Comenius University Bratislava	
Faculty: Faculty of Mathematics, Physics and Informatics	
Course ID: FMFI.KAMŠ/1-EFM-951/15	**Course title:** Mathematics Fundamentals
Number of credits: 2	
Educational level: I.	

Course requirements:
Examination: written and oral in front of the state commission
Scale of assessment (preliminary/final): 0/100

Learning outcomes:
The result will be the completion of the final state examination in the subject of the Mathematical Basis. This means that the student demonstrates an understanding of the basics of each subject in the subject syllabus in their interdisciplinary contexts.

Class syllabus:
1. Linear algebra and matrix calculus
Vector spaces: Linear dependence and independence of vectors, basis and dimension, linear envelope, subspaces, intersection, sum and direct sum of subspaces, projections, coordinate transformations.
Linear mappings: Matrix, kernel and image of linear mapping, coordinate transformations and similarity of linear representation matrices, eigenvalues and eigenvectors, invariant subspaces, characteristic polynomial, criteria of diagonalizability of matrices, Cayley-Hamilton theorem, Jordan normal form.
Bilinear and quadratic forms: Matrix of bilinear form in various bases, symmetric and cososymmetric forms, canonical form of quadratic form, Lagrange's method, Sylvester's law of inertia, positive definite quadratic forms and their matrices, properties of positive definite matrices.
Vector spaces with scalar product: Euclidean vector space, Gram matrix, basic metric concepts, relation of norm and scalar product, Gram-Schmidt orthogonalization process, orthonormal basis.
Gaussian elimination method and LU matrix decomposition, Fredholm alternative, orthogonal matrices and QR-decomposition, orthogonal projections and least squares method, normal system of linear equations.
Complexification of real vector space, realization of complex vector space, complex extension of real linear representation, real matrix of complex linear representation. Hermitian vector space, special complex matrices, Schur decomposition, unitary equivalence of matrices and normal matrices, spectral decomposition of matrices.
2. Mathematical analysis
Functions of one and more variables: Limit, continuity, differentiability, derivation, directional derivation, total differential. Functions specified implicitly, implicit function theorem. Inverse function theorem. Higher order derivatives. Sufficient conditions for the existence of a local extreme of functions of one and more variables.
Numerical series and function series, convergence criteria of numerical series (D'Alembert, Cauchy, Raabe, integral), uniform convergence of function series, Weierstrass's majority criterion. Power series, Taylor evolution of a function of one or more variables. Analytical functions. Fourier series and the criterion of their point convergence. Bessel's inequality and Parseval's equality.

Multivariate function optimization: Free and bounded extremes of multivariate functions. Necessary and sufficient conditions. Lagrange's theorem and Lagrange multipliers
Convex functions. Convexity criteria of functions of one and more variables.
Integration theory: Riemann integral of functions of one and more variables. Integral as a function of the upper bound. Parametric integrals. Continuity and differentiability of parametric integrals. Gamma function and its basic properties. Multidimensional integrals and substitution theorem. Curve integrals. Independence of the curve integral from the integration path, vector field potential. Green's formula of per partes integration for multidimensional integrals.
Standard spaces, complete spaces, open, closed and compact sets. Banach's fixed point theorem and its applications. Properties of continuous functions on compact sets (Weierstrass theorem).
3. Differential and difference equations
Discrete dynamical systems: Equilibrium states and their stability. Trajectory calculation.
Linear differential equations: Solution of autonomous homogeneous equations. Solving nonhomogeneous equations by the method of indefinite coefficients. Stability. Classification of two-dimensional autonomous equations. Fixed point and its stability.
Nonlinear differential equations: Equilibrium states and their stability. Trajectories of autonomous equations. Phase portraits of two-dimensional autonomous equations.
4. Probability and mathematical statistics.
Classical and axiomatic definition of probability. Conditional probability, Bayesian formula.
Random variable: probability distribution, distribution function of a random variable and its properties.
Discrete probability distributions: binomial, hypergeometric, Poisson, geometric. Continuous random variables: density and basic types of distributions: uniform, exponential, normal, mean and dispersion of random variables. Independence of random variables and uncorrelation. Correlation coefficient and its basic properties.
Central limit theorem and the law of large numbers.
Random vectors, mean and covariance matrix of a random vector. Marginal and conditional distributions, convolution of densities. Distributions derived from the normal: chi square, Student's distribution.
Linear model, parameter estimation, least squares method, maximum likelihood method.

State exam syllabus:

Recommended literature:

1. P. Zlatoš: Algebra a geometria, skriptá http://thales.doa.fmph.uniba.sk/zlatos/la/LAG_A4.pdf
G. Strang: Linear algebra and its applications, 1976 (ruský preklad 1980);
R. A. Horn, Ch. Johnson: Matrix Analysis, 1990.
2. T. Neubrunn, J. Vencko: Matematická analýza I, II. Skriptá UK Bratislava;
M. Barnovská, K. Smítalová: Matematická analýza III, IV. Skriptá UK Bratislava
Z. Kubáček, J. Valášek: Cvičenia z matematickej analýzy I, II. Skriptá UK Bratislava (www.iam.fmph.uniba.sk/skripta/kubacek);
M. Barnovská, K. Smítalová: Matematická analýza III, IV. Skriptá UK Bratislava
M. Kollár, Ľ. Kossaczká, D. Ševčovič: Diferenciálny a integrálny počet funkcií viac premenných v
príkladoch, Knižničné a edičné centrum FMFI UK, 2012, tretie doplnené vydanie, (www.iam.fmph.uniba.sk/institute/sevcovic/skripta/difint)
M. Barnovská a kol.: Cvičenia z matematickej analýzy III. Skriptá UK Bratislava (www.iam.fmph.uniba.sk/skripta/maiii);
3. P. Brunovský: Diferenčné a diferenciálne rovnice, Skriptá UK Bratislava, (www.iam.fmph.uniba.sk/skripta/brunovsky); S. H. Strogatz: Nonlinear Dynamics and

Chaos, Addison-Wesley/CRC Press, 2000;
J. Eliaš, J. Horváth, J. Kajan: Zbierka úloh z vyššej matematiky, 3.časť, Alfa, Bratislava, 1980;
4. K. Janková, A. Pázman: Pravdepodobnosť a štatistika, Univerzita Komenského Bratislava 2011;
R. Harman, E. Honschová, J. Somorčík: Zbierka úloh zo základov teórie pravdepodobnosti, PACI, Bratislava 2009;
T. Amemiya: Introduction to Statistics and Econometrics. Harvard Univ. Press, 1994;

Languages necessary to complete the course:
Slovak, English

Last change: 17.06.2022

Approved by: doc. RNDr. Zuzana Chladná, Dr.

COURSE DESCRIPTION

Academic year: 2024/2025

University: Comenius University Bratislava

Faculty: Faculty of Mathematics, Physics and Informatics

Course ID:	**Course title:**
FMFI.KAMŠ/1-EFM-230/15	Matrix Calculus

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: 3.

Educational level: I.

Prerequisites:

Course requirements:
Activity, homework, passing the test. Grading A (100-91), B (90-81), C (80-71), D (70-61), E (60-51), Fx (50-0).
Scale of assessment (preliminary/final): 100% / 0%

Learning outcomes:
Students become familiar with fundamental knowledge of matrix calculus useful in other fields of mathematics.

Class syllabus:
Partitioned matrices, Schur complement, various matrix classes and their properties (positive semi-definite matrices, hermitian, unitary and orthogonal matrices, stochastic matrices, permutation matrices, tri-diagonal and circulant matrices, nilpotent and unipotent matrices, normal matrices etc.), matrix norms, (condition number Frobenius norm, vector norm induced matrix norms and their properties), singualr values and singular value decomposition, other matrix decompositions, pseudo-inverse matrices and their properties.

Recommended literature:
F. Zhang - Matrix theory, Springer Verlag New York, 1999
C.D. Meyer Matrix analysis and applied linear algebra, SIAM, 2001,
David C. Lay Linear algebra and its applications, Pearson Education, 2016,
S.L. Campbell, Carl D. Meyer Generalised inverses of linear transformation, SIAM, 2009,
W. Ford Numerical linear algebra with applications using MATLAB, Elsevier 2014

Languages necessary to complete the course:
slovak, english

Notes:

Past grade distribution Total number of evaluated students: 291					
A	B	C	D	E	FX
44,33	27,15	18,21	6,87	3,09	0,34
Lecturers: Mgr. Jakub Hrdina, PhD., doc. RNDr. Mária Trnovská, PhD.					
Last change: 08.09.2023					
Approved by: doc. RNDr. Zuzana Chladná, Dr.					

COURSE DESCRIPTION

Academic year: 2024/2025

University: Comenius University Bratislava

Faculty: Faculty of Mathematics, Physics and Informatics

Course ID:	**Course title:**
FMFI.KAMŠ/1-EFM-350/00	Microeconomics

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: 5.

Educational level: I.

Prerequisites: FMFI.KAMŠ/1-EFM-140/17 - Economics (2) and FMFI.KAMŠ/1-EFM-250/00 - Mathematical Analysis (4) and FMFI.KAMŠ/1-EFM-220/00 - Linear Programming

Course requirements:
Continuous assessment: tests and homeworks
Examination: written test and oral exam
Grading scale: A 100-91%, B 90-81%, C 80-71%, D 70-61%, E 60-51%
Scale of assessment (preliminary/final): 30/70

Learning outcomes:
Students will gain knowledge of the basic principles of consumer and producer decision-making and their interactions.

Class syllabus:
Theory of firm. Consumer theory. Perfect competition. Effect of taxes and subsidies. Imperfect competition. Price discrimination. General Equilibrium in a Pure Exchange Economy. Uncertainty and risk. Economics and Information. Asymmetric information.

Recommended literature:
P. Brunovský: Mikorekonómia, Material available online on the course's web page.
H. Varian: Microeconomic Analysis. Norton 1992
A. Mas-Collel, M. D. Whinston, J. R. Green: Microeconomic Theory. Oxford 1995
R. Pindyck and D. Rubinfeld: Microeconomics, Pearson Series in Economics, 2012.

Languages necessary to complete the course:
Slovak, English

Notes:

Past grade distribution
Total number of evaluated students: 685

A	B	C	D	E	FX
14,89	18,54	20,15	20,73	22,34	3,36

Lecturers: doc. RNDr. Zuzana Chladná, Dr.

Last change: 21.06.2022
Approved by: doc. RNDr. Zuzana Chladná, Dr.

COURSE DESCRIPTION

Academic year: 2024/2025

University: Comenius University Bratislava

Faculty: Faculty of Mathematics, Physics and Informatics

Course ID:	**Course title:**
FMFI.KAMŠ/1-EFM-280/00	Money and Banking

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.

Prerequisites: FMFI.KAMŠ/1-EFM-120/17 - Economics (1)

Course requirements:
Exam: exam
Indicative assessment scale: A 90%, B 80%, C 70%, D 60%, E 50%
Scale of assessment (preliminary/final): 0/100

Learning outcomes:
The student masters the basics of monetary policy and commercial banking.

Class syllabus:
Money, interest rate, money demand, money supply, monetary policy, IS-LM model, AS-AD model and inflation, monetary policy in an open economy, commercial banking.

Recommended literature:
Study guide for money, banking and financial intermediation / Gary Smith. Lexington : D. C. Heath, 1991
Hubbard, R.G.: Money, the Financial System and the Economy, Addison-Wesley, 1999

Languages necessary to complete the course:
Slovak, English

Notes:

Past grade distribution
Total number of evaluated students: 765

A	B	C	D	E	FX
34,9	27,19	20,0	9,67	7,71	0,52

Lecturers: Mgr. Ing. Pavol Jurča, PhD.

Last change: 09.03.2022

Approved by: doc. RNDr. Zuzana Chladná, Dr.

COURSE DESCRIPTION

Academic year: 2024/2025

University: Comenius University Bratislava

Faculty: Faculty of Mathematics, Physics and Informatics

Course ID:	**Course title:**
FMFI.KAMŠ/1-EFM-320/15	Non-Linear Programming

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: 5.

Educational level: I.

Prerequisites: FMFI.KAMŠ/1-EFM-561/14 - Unconstrained Optimisation Methods

Course requirements:
Continuous assessment: project: 20%,
Exam: 80%. Grading: A (100-91), B (90-81), C (80-71), D (70-61), E (60-51), Fx (50-0).
Scale of assessment (preliminary/final): 20% / 80%

Learning outcomes:
Student has mastered the basics of nonlinear programming theory and methods.

Class syllabus:
Lagrange function and its properties, Lagrange duality, Transformations of optimization problems, Generalization of Lagrange function, Roode axioms, Min-max theorem, General principle of duality, Convex, quasiconvex and strong convex functions, Optimality conditions, Lagrange and Kuhn-Tucker theorem, Duality thoery in convex programming, Slater theorem, Interior point methods - introduction.

Recommended literature:
Nelineárne programovanie, teória a algoritmy / Milan Hamala, Mária Trnovská. Bratislava : EPOS, 2013
S. Boyd, L. Vandenberghe: Convex Optimization, Cambridge University Press, 2004.

Languages necessary to complete the course:
Slovak and English

Notes:

Past grade distribution
Total number of evaluated students: 309

A	B	C	D	E	FX
12,94	14,24	17,48	23,3	30,42	1,62

Lecturers: doc. RNDr. Mária Trnovská, PhD.

Last change: 16.06.2022

Approved by: doc. RNDr. Zuzana Chladná, Dr.

COURSE DESCRIPTION

Academic year: 2024/2025

University: Comenius University Bratislava

Faculty: Faculty of Mathematics, Physics and Informatics

Course ID:	**Course title:**
FMFI.KAMŠ/1-EFM-321/00	Non-Linear Programming Exercises

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: 5.

Educational level: I.

Prerequisites:

Course requirements:
Activity, homework, passing the test.
Grading
A (100-91), B (90-81), C (80-71), D (70-61), E (60-51), Fx (50-0).
Scale of assessment (preliminary/final): 100/0

Learning outcomes:
Students improve the knowledge required to pass the Non-Linear Programming course.

Class syllabus:
See the syllabus for the Non-Linear programming course.

Recommended literature:
Milan Hamala, Mária Trnovská: Nelineárne programovanie, teória a algoritmy. Bratislava : EPOS, 2013
S. Boyd, L. Vandenbergne: Convex optimization, Cambridge University Press, 2000.

Languages necessary to complete the course:
Slovak, English

Notes:

Past grade distribution
Total number of evaluated students: 506

A	B	C	D	E	FX
54,35	16,4	12,65	7,71	6,72	2,17

Lecturers: doc. RNDr. Mária Trnovská, PhD.

Last change: 16.06.2022

Approved by: doc. RNDr. Zuzana Chladná, Dr.

COURSE DESCRIPTION

Academic year: 2024/2025

University: Comenius University Bratislava

Faculty: Faculty of Mathematics, Physics and Informatics

Course ID:	**Course title:**
FMFI.KAMŠ/1-EFM-360/14	Numerical Methods

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: 6.

Educational level: I.

Prerequisites:

Course requirements:
Interim assessment during the semester has a weight of 40% (homeworks 30%, bonus exercises 10%). The two semester exam papers have a total weight of 60% (the first paper taken in the middle of the semester, the second paper taken at the end of the semester). The student must obtain at least half of the points from each semester exam paper. The final evaluation can be adjusted by an oral exam (theoretical questions, written preparation).
Grading: A (100-91), B (90-81), C (80-71), D (70-61), E (60-51), FX (50-0)
Scale of assessment (preliminary/final): 40/60

Learning outcomes:
The student has basic numerical mathematical methods that are necessary for solving problems using current computers and available software.

Class syllabus:
Representation of real numbers and computer arithmetics. Stability. Examples of instability: Recurrent relations and their use. Gronwall lemma. Evaluation of functions. Numerical methods for solving algebraic and transcendental equations. Numerical solution of systems of linear equations: Jacobi method, Gauss--Seidel method, Conjugate gradient method. Numerical solution of systems of nonlinear equations: Bisection method, Newton's method. Interpolation, optimal selection of interpolation nodes. Linear and cubic splines. The least squares method. Numerical differentiation and quadrature.

Recommended literature:
J. Babušíková, M. Slodička, J. Weisz: Numerické metódy, Bratislava: Univerzita Komenského, 2000
J. H. Mathews, K. K. Fink: Numerical Methods Using Matlab, Pearson, 2004
P. Guba: Numerické metódy, skriptá, FMFI UK, 2021

Languages necessary to complete the course:
Slovak, English

Notes:

Past grade distribution Total number of evaluated students: 347					
A	B	C	D	E	FX
40,06	21,04	18,44	10,66	9,51	0,29
Lecturers: doc. RNDr. Peter Guba, PhD., Mgr. Radoslav Hurtiš, PhD.					
Last change: 22.06.2022					
Approved by: doc. RNDr. Zuzana Chladná, Dr.					

COURSE DESCRIPTION

Academic year: 2024/2025

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., 3., 5.

Educational level: I., 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. RNDr. Zuzana Chladná, Dr.

COURSE DESCRIPTION

Academic year: 2024/2025

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., 4., 6.

Educational level: I., 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. RNDr. Zuzana Chladná, Dr.

COURSE DESCRIPTION

Academic year: 2024/2025

University: Comenius University Bratislava

Faculty: Faculty of Mathematics, Physics and Informatics

Course ID:	**Course title:**
FMFI.KTV/1-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: 0

Recommended semester: 1.

Educational level: I.

Prerequisites:

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

Learning outcomes:
Orientation in the history of the selected sports discipline, mastering the basic principles of compensation of mostly mental burdens of the individual. Creating a positive, lasting relationship to physical education and sports in the sense of calocagation. Mastering the demands for the development of motor abilities, skills, proper technique of performing individual movements in individual sports, individual game activities in collective sports games.

Class syllabus:
Introduction to the basic history of the selected sport, with the basic principles of compensation of one-sided psychological burden of the individual's body. Development of basic motor skills with a stop to all kinds of endurance, coordination, increasing the level of joint mobility. Training of individual game activities in collective sports games. In individual sports disciplines, practice of basic techniques of individual elements.

Recommended literature:

Languages necessary to complete the course:
Slovak, English

Notes:

Past grade distribution
Total number of evaluated students: 7059

A	B	C	D	E	FX
93,3	1,6	0,21	0,0	0,07	4,82

Lecturers: Mgr. Ladislav Mókus, PaedDr. Dana Mašlejová, 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, PaedDr. Lucia Ondrušová

Last change: 16.06.2022
Approved by: doc. RNDr. Zuzana Chladná, Dr.

COURSE DESCRIPTION

Academic year: 2024/2025

University: Comenius University Bratislava

Faculty: Faculty of Mathematics, Physics and Informatics

Course ID:	**Course title:**
FMFI.KTV/1-MXX-120/22	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: 1

Recommended semester: 2.

Educational level: I.

Prerequisites:

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

Learning outcomes:
Addressing a positive and lasting relationship with physical education and sport by understanding the importance of physical development and maintaining its optimal level throughout life. The use of strength and other motor skills to more rationally manage the game activities of the individual, while improving the acquisition of more complex elements of technology. In everyday life in providing basic necessities.

Class syllabus:
Completing a positive lasting relationship to physical education and sport. Development of motor skills with a focus on the development of strength, with an emphasis on dynamic strength and endurance in strength. In collective sports games, improving individual game activities, practicing basic game combinations, playing with modified rules, tasked games. In individual sports disciplines, the development of motor abilities and skills necessary for the acquisition of more complex elements of lower difficulty techniques.

Recommended literature:

Languages necessary to complete the course:
Slovak, English

Notes:

Past grade distribution
Total number of evaluated students: 5846

A	B	C	D	E	FX
95,59	1,51	0,14	0,09	0,05	2,63

Lecturers: Mgr. Tomáš Kuchár, PhD., PaedDr. Dana Mašlejová, Mgr. Ladislav Mókus, Mgr. Jana Leginusová, PaedDr. Mikuláš Ortutay, Mgr. Martin Dovičák, PhD., Mgr. Júlia Raábová, PhD., Mgr. Branislav Nedbálek, PhD., Mgr. Tomáš Lovecký, PaedDr. Lucia Ondrušová
Last change: 15.03.2022
Approved by: doc. RNDr. Zuzana Chladná, Dr.

COURSE DESCRIPTION

Academic year: 2024/2025

University: Comenius University Bratislava

Faculty: Faculty of Mathematics, Physics and Informatics

Course ID:	**Course title:**
FMFI.KTV/1-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.

Educational level: I.

Prerequisites:

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

Learning outcomes:

Class syllabus:
To practise game combinations, tactical - mechanical elements in basketball, volleyball, soccer, floorball, ice hockey, badminton, competition rules in the sports specialization.

Recommended literature:

Languages necessary to complete the course:
Slovak, English

Notes:

Past grade distribution
Total number of evaluated students: 3268

A	B	C	D	E	FX
98,29	0,46	0,09	0,03	0,0	1,13

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

Last change: 16.06.2022

Approved by: doc. RNDr. Zuzana Chladná, Dr.

COURSE DESCRIPTION

Academic year: 2024/2025

University: Comenius University Bratislava

Faculty: Faculty of Mathematics, Physics and Informatics

Course ID:	**Course title:**
FMFI.KTV/1-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.

Educational level: I.

Prerequisites:

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

Learning outcomes:

Class syllabus:
Preparation for sport championships of the Faculty in the chosen sport at modified rules. The selection of talented students into the teams of the University and Faculty leagues and other faculty sport events.

Recommended literature:

Languages necessary to complete the course:
Slovak, English

Notes:

Past grade distribution
Total number of evaluated students: 2956

A	B	C	D	E	FX
97,94	0,17	0,1	0,03	0,0	1,76

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

Last change: 15.03.2022

Approved by: doc. RNDr. Zuzana Chladná, Dr.

COURSE DESCRIPTION

Academic year: 2024/2025

University: Comenius University Bratislava

Faculty: Faculty of Mathematics, Physics and Informatics

Course ID:	**Course title:**
FMFI.KTV/1-MXX-310/00	Physical Education and Sport (5)

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: 5.

Educational level: I.

Prerequisites:

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

Learning outcomes:

Class syllabus:
Preparation and participation of individuals and teams in the system of university sport competitions and sport events.

Recommended literature:

Languages necessary to complete the course:
Slovak, English

Notes:

Past grade distribution
Total number of evaluated students: 2172

A	B	C	D	E	FX
98,66	0,37	0,09	0,0	0,0	0,87

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

Last change: 15.03.2022

Approved by: doc. RNDr. Zuzana Chladná, Dr.

COURSE DESCRIPTION

Academic year: 2024/2025

University: Comenius University Bratislava

Faculty: Faculty of Mathematics, Physics and Informatics

Course ID:	**Course title:**
FMFI.KTV/1-MXX-320/22	Physical Education and Sport (6)

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: 1

Recommended semester: 6.

Educational level: I.

Prerequisites:

Antirequisites: FMFI.KTV/1-MXX-320/00

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

Learning outcomes:

Class syllabus:
Using the communication in the physical education and sport and organizing the sport championships to achieve expressive motion of the sport and health in a valuable orientation the students.

Recommended literature:

Languages necessary to complete the course:
Slovak, English

Notes:

Past grade distribution
Total number of evaluated students: 204

A	B	C	D	E	FX
94,61	0,49	0,49	0,0	0,0	4,41

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, PaedDr. Lucia Ondrušová

Last change: 15.03.2022

Approved by: doc. RNDr. Zuzana Chladná, Dr.

COURSE DESCRIPTION

Academic year: 2024/2025

University: Comenius University Bratislava

Faculty: Faculty of Mathematics, Physics and Informatics

Course ID:	**Course title:**
FMFI.VC/1-EFM-535/00	Principles of Accounting

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: I.

Prerequisites:

Course requirements:
Continuous assessment: individual problem solving, continuous testing
Indicative assessment scale: A 90%, B 80%, C 70%, D 60%, E 50%
Scale of assessment (preliminary/final): 100/0

Learning outcomes:
The student masters the basics of internationally accepted accounting principles.

Class syllabus:
Accounting as the language of business, introduction to financial statements, accounting process, accounting principles, detailed characterization of the main balance sheet accounts, cash flow statement, financial statement analysis.
The course is based on the approach adopted in the international accounting standards IAS/IFRS

Recommended literature:
Financial Accounting and Reporting : A Global Perspective / Hervé Stolowy, Michel J. Lebas. London : Thomson Learning, 2006
Hervé Stolowy and Michel J. Lebas: Financial Accounting and Reporting. A global perspective
Anna Šlosárová a kolektív: Analýza účtovnej závierky
IASB Framework for the Preparation and Presentation of Financial Statements
Zákon o účtovníctve č. 431/2002 Z.z. v znení neskorších predpisov

Languages necessary to complete the course:
Slovak, English

Notes:

Past grade distribution
Total number of evaluated students: 531

A	B	C	D	E	FX
80,6	10,55	5,65	2,07	0,94	0,19

Lecturers: doc. RNDr. Peter Mederly, CSc.

Last change: 09.03.2022
Approved by: doc. RNDr. Zuzana Chladná, Dr.

COURSE DESCRIPTION

Academic year: 2024/2025

University: Comenius University Bratislava

Faculty: Faculty of Mathematics, Physics and Informatics

Course ID:	**Course title:**
FMFI.KAMŠ/1-MAT-281/00	Probability and Statistics (1)

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: 3.

Educational level: I.

Prerequisites: (FMFI.KMANM/1-MAT-150/00 - Mathematical Analysis (2) or FMFI.KAMŠ/1-EFM-130/00 - Mathematical Analysis (2)) and (FMFI.KAG/1-MAT-120/15 - Linear Algebra and Geometry (1) or FMFI.KAG/1-MMN-120/22 - Linear Algebra and Geometry (1) or FMFI.KAG/1-MMN-120/00 - Linear Algebra and Geometry (1) or FMFI.KAG/1-EFM-121/15 - Linear Algebra and Geometry (1))

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

Learning outcomes:
After completing the course the student will be able to use classical probability models, axiomatic approach to the definition of probability. He will master one dimensional discrete and continuous random variables. He will be given an introduction to selected statistical procedures: point and interval estimates of parameters sampling normal distribution.

Class syllabus:
Probability space. Classical probability models. Random variable and distribution function. Elementary discrete and continuous distributions, expectation and variance. Independence and correlation. Normal distribution and the central limit theorem. Random sample, sample mean, sample variance. Sampling normal distribution. Estimation of parameters, maximal likelihood, confidence intervals for the mean of a normal distribution.

Recommended literature:
Janková, K., Pázman, A.: Pravdepodobnosť a štatistika, Vydavateľstvo UK 2011
Harman, R., Honschová, E., Somorčík, J.: Zbierka úloh zo základov teórie pravdepodobnosti, Paci Bratislava 2009
G.R.Grimmett, D. Stirzaker: Probability and Random Processes. Oxford University Press 2001

Languages necessary to complete the course:
Slovak, English

Notes:					
Past grade distribution Total number of evaluated students: 1545					
A	B	C	D	E	FX
17,61	12,49	17,67	21,75	23,95	6,54
Lecturers: doc. RNDr. Katarína Janková, CSc., Mgr. Ján Veselý, Mgr. Erika Lejtrich					
Last change: 09.03.2022					
Approved by: doc. RNDr. Zuzana Chladná, Dr.					

COURSE DESCRIPTION

Academic year: 2024/2025

University: Comenius University Bratislava

Faculty: Faculty of Mathematics, Physics and Informatics

Course ID:	**Course title:**
FMFI.KAMŠ/1-MAT-282/00	Probability and Statistics (2)

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: 4.

Educational level: I.

Prerequisites: FMFI.KAMŠ/1-MAT-281/00 - Probability and Statistics (1)

Course requirements:
Preliminary assessment: test
Examination: written examination
Approximate final assessment: A 90%, B 80%, C 70%, D 60%, E 50%
Scale of assessment (preliminary/final): 30/70

Learning outcomes:
After completing the course the student will master multivariate discrete and continuous distributions. He will be able to calculate distributions of sums, products and ratios of independent random variables. He will know the technique of characteristic functions and will be able to apply it to the multidimensional normal distribution. The knowledge of probability methods will be applied to selected statistical problems of parameter estimation and hypotheses testing.

Class syllabus:
Multiple random variables, their distribution and characteristics. Elementary introduction to Lebesgue integral. Marginal and conditional distributions and densities. Independence, sums of independent random variables. Characteristic functions and their applications. Convergence of sequences of random variables, central limit theorems and weak law of large numbers. Statistical inference: estimation of parameters, maximal likelihood estimates, hypothesis testing. Neyman Pearson lemma. Regression models: least squares and maximal likelihood estimation of parameters. Goodness of fit tests.

Recommended literature:
Janková, K., Pázman, A.: Pravdepodobnosť a štatistika, Vydavateľstvo UK 2011
K. Zvára, J. Štěpán: Pravděpodobnost a matematická statistika, Matfzypress 1997
Harman, R., Honschová, E., Somorčík, J.: Zbierka úloh zo základov teórie pravdepodobnosti, Paci Bratislava 2009
G.R.Grimmett, D. Stirzaker: Probability and Random Processes. Oxford University Press 2001

Languages necessary to complete the course:
Slovak, English

Notes:					
Past grade distribution Total number of evaluated students: 1502					
A	B	C	D	E	FX
18,44	10,45	15,31	19,91	27,63	8,26
Lecturers: doc. RNDr. Katarína Janková, CSc., Mgr. Erika Lejtrich, Mgr. Ján Veselý					
Last change: 09.03.2022					
Approved by: doc. RNDr. Zuzana Chladná, Dr.					

COURSE DESCRIPTION

Academic year: 2024/2025

University: Comenius University Bratislava

Faculty: Faculty of Mathematics, Physics and Informatics

Course ID:	**Course title:**
FMFI.KAMŠ/1-PMA-754/16	Probability and Statistics Classes (1)

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

Number of credits: 1

Recommended semester: 3.

Educational level: I.

Prerequisites:

Course requirements:
Preliminary evaluation: tests.
Scale of assessment (preliminary/final): 100/0

Learning outcomes:
After completing the course, students will be able to solve the problems of one-dimensional discrete and continuous random variables. Furthermore, students will be able to solve some statistical problems.

Class syllabus:
Probability space. Classical probability models and discrete distributions. Random variable and its distribution function. Basic types of discrete and continuous random variables. Expected value and variance. Independence and correlation coefficient. Normal distribution and central limit theorem. Random sample, its mean, sample variance. Random sample from normal distribution. Point estimates of unknown parameters, maximum likelihood estimation. Confidence intervals for the mean of the normal distribution.

Recommended literature:
Pravdepodobnosť a štatistika / Katarína Janková, Andrej Pázman. Bratislava : Univerzita Komenského, 2011
Zbierka úloh zo základov teórie pravdepodobnosti / Radoslav Harman, Erika Hönschová, Ján Somorčík. Bratislava : PACI, 2009

Languages necessary to complete the course:
Slovak, English

Notes:

Past grade distribution
Total number of evaluated students: 449

A	B	C	D	E	FX
65,92	6,68	9,35	8,24	5,12	4,68

Lecturers: Mgr. Ján Veselý, Mgr. Erika Lejtrich
Last change: 21.06.2022
Approved by: doc. RNDr. Zuzana Chladná, Dr.

COURSE DESCRIPTION

Academic year: 2024/2025

University: Comenius University Bratislava

Faculty: Faculty of Mathematics, Physics and Informatics

Course ID:	**Course title:**
FMFI.KAMŠ/1-PMA-753/15	Probability and Statistics Classes (2)

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

Number of credits: 1

Recommended semester: 4.

Educational level: I.

Prerequisites:

Course requirements:
Preliminary evaluation: tests.
Scale of assessment (preliminary/final): 100/0

Learning outcomes:
Students will practice working with multidimensional discrete and continuous probability distributions. They will be able to apply the acquired knowledge in solving selected statistical problems.

Class syllabus:
Random vectors and their characteristics. Marginal and conditional distributions. Characteristic functions. Multidimensional normal distribution and its properties. Convergence of the sequence of random variables. Central limit theorem, laws of large numbers. Statistical inference, parameter estimation, maximum likelihood method, statistical hypothesis testing.

Recommended literature:
Pravdepodobnosť a štatistika / Katarína Janková, Andrej Pázman. Bratislava : Univerzita Komenského, 2011
Zbierka úloh zo základov teórie pravdepodobnosti / Radoslav Harman, Erika Hönschová, Ján Somorčík. Bratislava : PACI, 2009

Languages necessary to complete the course:
Slovak, English

Notes:

Past grade distribution
Total number of evaluated students: 497

A	B	C	D	E	FX
67,81	11,27	6,64	6,04	3,62	4,63

Lecturers: Mgr. Lívia Rosová, PhD., Mgr. Erika Lejtrich, Mgr. Ján Veselý

Last change: 21.06.2022
Approved by: doc. RNDr. Zuzana Chladná, Dr.

COURSE DESCRIPTION

Academic year: 2024/2025

University: Comenius University Bratislava

Faculty: Faculty of Mathematics, Physics and Informatics

Course ID:	**Course title:**
FMFI.KAMŠ/1-PMA-752/14	Problem Solving Methods in Probability and Statistics

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.

Educational level: I.

Prerequisites: FMFI.KAMŠ/1-MAT-281/00 - Probability and Statistics (1) or FMFI.KAMŠ/1-DAV-201/20 - Fundamentals of Probability and Statistics

Recommended prerequisites:
the basics of the R language, or good skill in programming in another language

Course requirements:
Assessment during the term: homework (60%), test (40%).
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:
Student gains skills in applying the knowledge from probability and statistics to solve problems, including real life applications.

Class syllabus:
Combinatorial probability, conditional probabilities, Bayes theorem. Discrete and continuous random variables and random vectors - computation of probabilities, moments, transformations, computer simulations, applications. Selected statistical methods.

Recommended literature:
Jiří Anděl: Matematika náhody. Praha, MatfyzPress, 2000.

Languages necessary to complete the course:
Slovak, English

Notes:

Past grade distribution
Total number of evaluated students: 137

A	B	C	D	E	FX
71,53	13,14	6,57	3,65	1,46	3,65

Lecturers: doc. RNDr. Beáta Stehlíková, PhD.

Last change: 16.05.2024

Approved by: doc. RNDr. Zuzana Chladná, Dr.

COURSE DESCRIPTION

Academic year: 2024/2025

University: Comenius University Bratislava

Faculty: Faculty of Mathematics, Physics and Informatics

Course ID:	**Course title:**
FMFI.KDMFI/1-MAT-130/22	Programming (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: I.

Prerequisites:

Course requirements:
Active work on practice lessons at which a student solve assigned tasks is required. At least 80% of completed practice lessons are need to be admitted to the final examination. During the final examination, the student solves a practical assignment on a computer and according to obtained score, he/she receives a grade: A (90%), B (80%), C (70%), D (60%), E (50%) or FX (less than 50%).
Scale of assessment (preliminary/final): 0/100

Learning outcomes:
Students are able to solve problems algorithmically, to process large number of data and to communicate with the user using basic constructions and data types of programming language Python.

Class syllabus:
Expressions and variables.
Loops.
Program branching.
Subroutines and functions.
List.
Solving mathematical and geometrical problems.
User interaction.

Recommended literature:
Salanci, L.: www.salanci.sk - web page with lectures and exercises

Languages necessary to complete the course:
Slovak, English

Notes:

Past grade distribution Total number of evaluated students: 1043					
A	B	C	D	E	FX
51,1	9,3	6,14	6,52	8,34	18,6
Lecturers: doc. RNDr. Ľubomír Salanci, PhD.					
Last change: 22.02.2023					
Approved by: doc. RNDr. Zuzana Chladná, Dr.					

COURSE DESCRIPTION

Academic year: 2024/2025

University: Comenius University Bratislava

Faculty: Faculty of Mathematics, Physics and Informatics

Course ID:	**Course title:**
FMFI.KDMFI/1-MAT-170/22	Programming (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: I.

Prerequisites: FMFI.KDMFI/1-MAT-130/22 - Programming (1) or FMFI.KDMFI/1-MAT-130/14 - Programming (1)

Recommended prerequisites:
Programming 1

Course requirements:
Active work on practice lessons at which a student solve assigned tasks is required. At least 80% of completed practice lessons are need to be admitted to the final examination. During the final examination, the student solves a practical assignment on a computer and according to obtained score, he/she receives a grade: A (90%), B (80%), C (70%), D (60%), E (50%) or FX (less than 50%).
Scale of assessment (preliminary/final): 0/100

Learning outcomes:
Using object-oriented programming in the Python programming language, students are able to solve problems algorithmically, process structured data and interact with the user.

Class syllabus:
Strings.
Objects.
Many objects.
Turtle graphics.
Recursion.
Files,
Solving mathematical and geometrical problems.
User interaction.

Recommended literature:
Salanci, L.: www.salanci.sk - web page with lectures and exercises

Languages necessary to complete the course:
Slovak, English

Notes:

Past grade distribution Total number of evaluated students: 1961					
A	B	C	D	E	FX
34,83	16,47	12,19	12,39	17,54	6,58
Lecturers: doc. RNDr. Ľubomír Salanci, PhD.					
Last change: 22.02.2023					
Approved by: doc. RNDr. Zuzana Chladná, Dr.					

COURSE DESCRIPTION

Academic year: 2024/2025

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.

Educational level: I., 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. RNDr. Zuzana Chladná, Dr.

COURSE DESCRIPTION

Academic year: 2024/2025

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.

Educational level: I., 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. RNDr. Zuzana Chladná, Dr.

COURSE DESCRIPTION

Academic year: 2024/2025

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.

Educational level: I., 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. RNDr. Zuzana Chladná, Dr.

COURSE DESCRIPTION

Academic year: 2024/2025

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.

Educational level: I., 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. RNDr. Zuzana Chladná, Dr.

COURSE DESCRIPTION

Academic year: 2024/2025

University: Comenius University Bratislava

Faculty: Faculty of Mathematics, Physics and Informatics

Course ID:	**Course title:**
FMFI.KAI/2-IKVa-192/19	Science, Technology and Humanity: Opportunities and Risks

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: 5

Recommended semester: 2.

Educational level: I., II.

Prerequisites:

Course requirements:
Semestral evaluation: active participation
Final evaluation: essay
Weight of the final evaluation: 60%
To achieve an A, 90% is needed, for B at least 80%, for C 70%, for D, 60% and for an E, at least 50% of overall assessment.

Learning outcomes:
The students will gain awareness of the contemporary and potential future challenges posed by scientific and technological innovations and their impact on human behaviour, culture and society.

Class syllabus:
Big data: privacy, politics and power,
Internet of things, it usefulness and threats,
Assistant AI and its place in future society,
Job market and inequality,
Enhancements and human rights and the right to change self and others,
Initiatives for responsible research,
Artificial minds,
Hybridization between species and between AI and organic minds,
Future of minds and trans-humanism,
Artificial emotional intelligence,
An after human era.

Recommended literature:
- S. Russell: Human compatible. Artificial intelligence and the problem of control. Viking, 2019.
- J. Havens: Heartificial intelligence. Embracing our humanity to maximize machines. Penguin, 2016.
- P. Boddington: Towards a code of ethics for artificial intelligence. Springer, 2017.
- M. Shanahan: The technological singularity. MIT Press, 2015.

- C. MacKellar, C.: Cyborg Mind: What Brain–Computer and Mind–Cyberspace Interfaces Mean for Cyberneuroethics. Berghahn Books, 2019.
- G. Bel, J. Gemmell: Total Recall, How the e-Memory Revolution will change everything. Dutton, 2009.
- S. Zuboff: The Age of Surveillance Capitalism: The Fight for a Human Future at the New Frontier of Power. PublicAffairs, 2019.
- C. O'Neil: Weapons of Math Destruction: How Big Data Increases Inequality and Threatens Democracy. Crown Publishers, 2016.
- M. Tegmark: Life 3.0. Allen Lane, 2017.

Languages necessary to complete the course:
English

Notes:

Past grade distribution
Total number of evaluated students: 146

A	B	C	D	E	FX
40,41	21,92	16,44	6,85	4,79	9,59

Lecturers: doc. RNDr. Martin Takáč, PhD., PhDr. Ing. Tomáš Gál, PhD.

Last change: 28.02.2020

Approved by: doc. RNDr. Zuzana Chladná, Dr.

COURSE DESCRIPTION

Academic year: 2024/2025

University: Comenius University Bratislava

Faculty: Faculty of Mathematics, Physics and Informatics

Course ID:	**Course title:**
FMFI.KAMŠ/1-EFM-235/15	Seminar in Matrix Calculus

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: I.

Prerequisites:

Course requirements:
Activity, homework (100%). Grading A (100-91), B (90-81), C (80-71), D (70-61), E (60-51), Fx (50-0).
Scale of assessment (preliminary/final): 100% /0%

Learning outcomes:
Acquisition of knowledge and practice of tasks from the subject Matrix calculus.

Class syllabus:
See: Matrix calculus

Recommended literature:
C.D. Meyer Matrix analysis and applied linear algebra, SIAM, 2001,
David C. Lay Linear algebra and its applications, Pearson Education, 2016,
S.L. Campbell, Carl D. Meyer Generalised inverses of linear transformation, SIAM, 2009,
W. Ford Numerical linear algebra with applications using MATLAB, Elsevier 2014

Languages necessary to complete the course:
Slovak and English

Notes:

Past grade distribution
Total number of evaluated students: 185

A	B	C	D	E	FX
76,22	19,46	4,32	0,0	0,0	0,0

Lecturers: doc. RNDr. Mária Trnovská, PhD.

Last change: 16.06.2022

Approved by: doc. RNDr. Zuzana Chladná, Dr.

COURSE DESCRIPTION

Academic year: 2024/2025

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.

Educational level: I., 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. RNDr. Zuzana Chladná, Dr.

COURSE DESCRIPTION

Academic year: 2024/2025

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.

Educational level: I., 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: 87

A	ABS	B	C	D	E	FX	NEABS
63,22	18,39	1,15	1,15	0,0	0,0	9,2	6,9

Lecturers: Mgr. Aneta Barnes

Last change: 21.06.2022

Approved by: doc. RNDr. Zuzana Chladná, Dr.

COURSE DESCRIPTION

Academic year: 2024/2025

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.

Educational level: I., 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. RNDr. Zuzana Chladná, Dr.

COURSE DESCRIPTION

Academic year: 2024/2025

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.

Educational level: I., 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. RNDr. Zuzana Chladná, Dr.

COURSE DESCRIPTION

Academic year: 2024/2025

University: Comenius University Bratislava

Faculty: Faculty of Mathematics, Physics and Informatics

Course ID:	**Course title:**
FMFI.KTV/1-MXX-115/15	Sports in Nature (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.

Educational level: I.

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 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 does not rent ski equipment.

Past grade distribution
Total number of evaluated students: 300

A	B	C	D	E	FX
99,0	0,33	0,33	0,0	0,0	0,33

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, Mgr. Branislav Nedbálek, PhD.

Last change: 16.06.2022
Approved by: doc. RNDr. Zuzana Chladná, Dr.

COURSE DESCRIPTION

Academic year: 2024/2025

University: Comenius University Bratislava

Faculty: Faculty of Mathematics, Physics and Informatics

Course ID:	**Course title:**
FMFI.KTV/1-MXX-215/15	Sports in Nature (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.

Educational level: I.

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: 297

A	B	C	D	E	FX
92,59	0,0	0,0	0,0	0,34	7,07

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, Mgr. Branislav Nedbálek, PhD.
Last change: 16.06.2022
Approved by: doc. RNDr. Zuzana Chladná, Dr.

COURSE DESCRIPTION

Academic year: 2024/2025

University: Comenius University Bratislava

Faculty: Faculty of Mathematics, Physics and Informatics

Course ID:	**Course title:**
FMFI.KTV/1-MXX-216/18	Sports in Nature (3)

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

Number of credits: 1

Recommended semester: 3.

Educational level: I.

Prerequisites:

Antirequisites: FMFI.KTV/1-UXX-151/22

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: 55

A	B	C	D	E	FX
98,18	0,0	0,0	0,0	0,0	1,82

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, Mgr. Branislav Nedbálek, PhD.
Last change: 16.06.2022
Approved by: doc. RNDr. Zuzana Chladná, Dr.

COURSE DESCRIPTION

Academic year: 2024/2025

University: Comenius University Bratislava

Faculty: Faculty of Mathematics, Physics and Informatics

Course ID:	**Course title:**
FMFI.KTV/1-MXX-217/18	Sports in Nature (4)

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

Number of credits: 1

Recommended semester: 4.

Educational level: I.

Prerequisites:

Antirequisites: FMFI.KTV/1-UXX-152/22

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 material equipment.

Past grade distribution
Total number of evaluated students: 40

A	B	C	D	E	FX
90,0	0,0	0,0	0,0	0,0	10,0

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, Mgr. Branislav Nedbálek, PhD.
Last change: 16.06.2022
Approved by: doc. RNDr. Zuzana Chladná, Dr.

COURSE DESCRIPTION

Academic year: 2024/2025

University: Comenius University Bratislava

Faculty: Faculty of Mathematics, Physics and Informatics

Course ID:	**Course title:**
FMFI.KAMŠ/1-EFM-330/00	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: 5.

Educational level: I.

Prerequisites: FMFI.KAMŠ/1-MAT-282/00 - Probability and Statistics (2)

Recommended prerequisites:
Probability and statistics (2) 1-MAT-282

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 will be able to apply some basic methods of mathematical statistics, while understanding their principles. They will also understand some general statistical techniques and they will be able to apply them.

Class syllabus:
Properties of sample mean and sample variance. t-tests and F-tests. Basic confidence intervals and the Bonferroni method. How to create a test? How to measure test quality? Neyman-Pearson's lemma and UMP tests for compound hypotheses. How to measure the quality of estimates? BLUE. BUE and its uniqueness. Fisher information and Cramér-Rao inequality. Asymptotic properties of maximum likelihood estimates & tests. Wald test and score test. Bootstrap and jackknife.

Recommended literature:
Casella G, Berger R: Statistical inference. 2nd ed. Cengane Learning 2001;
Anděl J: Základy matematické statistiky. Matfyzpress 2005.

Languages necessary to complete the course:
Slovak, English

Notes:

Past grade distribution
Total number of evaluated students: 710

A	B	C	D	E	FX
40,99	17,04	14,93	12,25	12,39	2,39

Lecturers: Mgr. Ján Somorčík, PhD.
Last change: 11.03.2022
Approved by: doc. RNDr. Zuzana Chladná, Dr.

COURSE DESCRIPTION

Academic year: 2024/2025

University: Comenius University Bratislava

Faculty: Faculty of Mathematics, Physics and Informatics

Course ID:	**Course title:**
FMFI.KJP/1-MXX-133/18	Supplementary English 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.

Educational level: I.

Prerequisites:

Course requirements:
tests, homework
Scale of assessment (preliminary/final): 100/0 credit - ongoing evaluationMinimum 65 percent of the total points for the assigned work is needed to pass the course. Points can be awarded for attendance, completed homework tasks, and short tests assigned during the course.A 100-93 %B 92-85 %C 84-77 %D 76-70 %E 69-65 %Course prerequisites:https://fmph.uniba.sk/microsites/kjp/katedra-jazykovej-pripravy/poziadavky-na-udelenie-priebezneho-hodnotenia-aj1aj2aj3-ostatne-kurzy/

Learning outcomes:

Class syllabus:
Texts dealing with the most important topics for FMPI majors combining grammar revision with vocabulary needed to pass the A4 English exam.

Recommended literature:
Study materials are created by the teacher and available in electronic form.
Raymond Murphy: Essential Grammar in USe, Cambridge University Press, 1998
Michael McCarthy, Felicity O'Dell: English Vocabulary in Use, Cambridge University Press, 1994

Languages necessary to complete the course:
English

Notes:

Past grade distribution
Total number of evaluated students: 68

A	B	C	D	E	FX
51,47	20,59	7,35	4,41	4,41	11,76

Lecturers: Mgr. Ing. Jana Kočvarová

Last change: 11.04.2024
Approved by: doc. RNDr. Zuzana Chladná, Dr.

COURSE DESCRIPTION

Academic year: 2024/2025

University: Comenius University Bratislava

Faculty: Faculty of Mathematics, Physics and Informatics

Course ID:	**Course title:**
FMFI.KJP/1-MXX-134/18	Supplementary English 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.

Educational level: I.

Prerequisites:

Course requirements:
tests, homework
Scale of assessment (preliminary/final): 100/0 ENcredit - ongoing evaluation Minimum 65 percent of the total points for the assigned work is needed to pass the course. Points can be awarded for attendance, completed homework tasks, and short tests assigned during the course. A 100-93 % B 92-85 % C 84-77 % D 76-70 % E 69-65 %Course prerequisites:https://fmph.uniba.sk/microsites/kjp/katedra-jazykovej-pripravy/poziadavky-na-udelenie-priebezneho-hodnotenia-aj1aj2aj3-ostatne-kurzy/

Learning outcomes:

Class syllabus:
Texts dealing with the most important topics for FMPI majors combining grammar revision with vocabulary needed to pass the A4 English exam.

Recommended literature:
Study materials are created by the teacher and available in electronic form. Raymond Murphy: Essential Grammar in USe, Cambridge University Press, 1998 Michael McCarthy, Felicity O'Dell: English Vocabulary in Use, Cambridge University Press, 1994

Languages necessary to complete the course:
English

Notes:

Past grade distribution
Total number of evaluated students: 72

A	B	C	D	E	FX
54,17	13,89	4,17	8,33	5,56	13,89

Lecturers: Mgr. Ing. Jana Kočvarová

Last change: 11.04.2024

Approved by: doc. RNDr. Zuzana Chladná, Dr.

COURSE DESCRIPTION

Academic year: 2024/2025

University: Comenius University Bratislava

Faculty: Faculty of Mathematics, Physics and Informatics

Course ID:	**Course title:**
FMFI.KAMŠ/1-EFM-561/14	Unconstrained Optimisation Methods

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: 3

Recommended semester: 4.

Educational level: I.

Prerequisites: (FMFI.KAG/1-EFM-160/12 - Linear Algebra and Geometry (2) or FMFI.KAG/1-DAV-104/20 - Linear Algebra) and (FMFI.KAMŠ/1-EFM-130/00 - Mathematical Analysis (2) or FMFI.KAMŠ/1-DAV-102/20 - Calculus (1))

Course requirements:
Continuous assessment: exercises: 20%, project: 20%, Exam: 60%. The student must obtain at least half of the points for the exercises in order to pass the final written exam. Grading: A (100-91), B (90-81), C (80-71), D (70-61), E (60-51), Fx (50-0).
Scale of assessment (preliminary/final): 40% / 60%

Learning outcomes:
Students master classical and modern methods of unconstrained optimization methods for functions of one and several variables, theoretical and practical aspects of these methods and their significance for solving nonlinear programming problems with boundaries. They also become familiar with some practical problems, that can be solved using unconstrained optimization methods.

Class syllabus:
Introduction to the subject, Classification of optimization problems, Methods of minimizing the function of one variable (Interval approximation methods, Interpolation methods), Classical methods for minimizing n-variable function (Classification of methods and basic algorithmic schemes, Cauchy's method (steepest descent), coordinate descent Newton's method and modified Newton's method), Modern methods for minimizing the function of n variables (Conjugate gradient method, Quasi Newton method, Broyden class and other parametric classes of Quasi Newton formulas)

Recommended literature:
Nelineárne programovanie, teória a algoritmy / Milan Hamala, Mária Trnovská. Bratislava : EPOS, 2013
Algorithms for Optimization, Kochenderfer, Wheeler, MIT Press, 2019
Optimization Theory and Methods, Nonlinear programming, Sun, Yuan, Springer 2006

Languages necessary to complete the course:
Slovak, English

Notes:

Past grade distribution
Total number of evaluated students: 467

A	B	C	D	E	FX
19,91	15,42	16,49	19,49	21,2	7,49

Lecturers: doc. RNDr. Mária Trnovská, PhD., Mgr. Radoslav Hurtiš, PhD.

Last change: 16.06.2022

Approved by: doc. RNDr. Zuzana Chladná, Dr.