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COURSE DESCRIPTION

Academic year: 2026/2027

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: 4.

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. Mgr. Tomáš Vinař, PhD., prof. Mgr. Radoslav Harman, PhD.

COURSE DESCRIPTION

Academic year: 2026/2027

University: Comenius University Bratislava

Faculty: Faculty of Mathematics, Physics and Informatics

Course ID:	**Course title:**
FMFI.KI/1-INF-220/00	Algorithms and Data Structures

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: 3.

Educational level: I.

Prerequisites:

Recommended prerequisites:
1-INF-166 Programming (2) in Java or 1-AIN-170 Programming (2)

Course requirements:
To complete the course, it is necessary to obtain at least 70% of points during the semester. The grade is based on a final written exam and an optional oral exam.
Scale of assessment (preliminary/final): 0/100

Learning outcomes:
Students will be familiar with basics of design and analysis of efficient algorithms and data structures. The students will be able to analyze the time complexity of basic algorithms, to use basic algorithmic techniques (sorting and searching arrays), use basic efficient data structures and understand their implementation.

Class syllabus:
Asymptotic running time analysis, methods of estimation, notation. Sorting: meargesort, heapsort, quicksort; sorting in linear time. Data structures: priority queues, hash tables, binary search trees and their balancing. Efficient algorithm design techniques: dynamic programming, greedy algorithms.

Recommended literature:
Introduction to algorithms / Thomas H. Cormen ... [et al.]. Cambridge, Mass. : MIT Press, 2001
Algorithms in C : Parts 1-4 : Fundamentals, data structures, sorting, searching / Robert Sedgewick. Boston : Addison-Wesley, 1998
Custom course notes published at the course website

Languages necessary to complete the course:
Slovak, English

Notes:

Past grade distribution Total number of evaluated students: 839					
A	B	C	D	E	FX
38,62	15,14	16,09	11,2	11,92	7,03
Lecturers: prof. RNDr. Rastislav Kráľovič, PhD., RNDr. Šimon Sádovský, PhD.					
Last change: 23.06.2022					
Approved by: doc. Mgr. Tomáš Vinař, PhD., prof. Mgr. Radoslav Harman, PhD.					

STATE EXAM DESCRIPTION

Academic year: 2026/2027	
University: Comenius University Bratislava	
Faculty: Faculty of Mathematics, Physics and Informatics	
Course ID: FMFI.KAI+KAMŠ/1-DAV-990/22	**Course title:** Bachelor Thesis Defense
Number of credits: 10	
Educational level: I.	
Learning outcomes: Student will demonstrate ability of creative work in the area of data science by completion and successful defense of bachelor's thesis.	
State exam syllabus: Bachelor's thesis defense.	
Last change: 15.03.2022	
Approved by: doc. Mgr. Tomáš Vinař, PhD., prof. Mgr. Radoslav Harman, PhD.	

COURSE DESCRIPTION

Academic year: 2026/2027

University: Comenius University Bratislava

Faculty: Faculty of Mathematics, Physics and Informatics

Course ID:	**Course title:**
FMFI.KI+KAI/1-DAV-921/20	Bachelor Thesis Seminar (1)

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: 1

Recommended semester: 5.

Educational level: I.

Prerequisites:

Course requirements:
During the semester: Active participation, presentations, homework.
During exam period: submission of a part of the bachelor thesis.
Grades: A 90%, B 80%, C 70%, D 60%, E 50%. More information on the course website.
Scale of assessment (preliminary/final): 55/45

Learning outcomes:
Students will be familiar with thesis requirements. They will select a thesis topic and a supervisor, find appropriate literature and submit the first portion of the thesis text.

Class syllabus:
Types of theses, their structure. Planning the thesis work, analyzing the problem. Student presentations of selected topics.

Recommended literature:
Ako písať vysokoškolské a kvalifikačné práce : Ako písať seminárne práce, ročníkové práce, práce študentskej vedeckej a odbornej činnosti, diplomové práce, záverečné a atestačné práce, dizertácie / Dušan Katuščák. Bratislava : Stimul, 1998

Languages necessary to complete the course:
Slovak, English

Notes:

Past grade distribution
Total number of evaluated students: 105

A	B	C	D	E	FX
59,05	28,57	4,76	0,95	0,0	6,67

Lecturers: doc. Mgr. Bronislava Brejová, PhD., Mgr. Askar Gafurov, PhD.

Last change: 27.10.2023

Approved by: doc. Mgr. Tomáš Vinař, PhD., prof. Mgr. Radoslav Harman, PhD.

COURSE DESCRIPTION

Academic year: 2026/2027	
University: Comenius University Bratislava	
Faculty: Faculty of Mathematics, Physics and Informatics	
Course ID: FMFI.KAI+KAMŠ/1-DAV-922/20	**Course title:** Bachelor Thesis Seminar (2)
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: 1	
Recommended semester: 6.	
Educational level: I.	
Prerequisites:	
Course requirements: During the semester: Active participation, presentations, homework. During exam period: presentation, bachelor thesis submission. Grades: A 90%, B 80%, C 70%, D 60%, E 50%. More information on the course website. Scale of assessment (preliminary/final): 30/70	
Learning outcomes: Students will be familiar with research methods and principles of technical writing in data science. Students will be able to present their results in both written and oral form. They will be familiar with required thesis form and style.	
Class syllabus: Research methods, experimental evaluation. Principles of technical writing (typical document structure, references, illustrations and tables, appendices, correct use of formalism, authorship and plagiarism). Oral presentation guidelines (structure of a presentation, recommended visual aids). Regular presentation of current progress on the thesis topic, group discussion.	
Recommended literature: Ako písať vysokoškolské a kvalifikačné práce : Ako písať seminárne práce, ročníkové práce, práce študentskej vedeckej a odbornej činnosti, diplomové práce, záverečné a atestačné práce, dizertácie / Dušan Katuščák. Bratislava : Stimul, 1998 Smernica pre záverečné práce na Univerzite Komenského. Pôvodné vedecké publikácie podľa témy bakalárskej práce.	
Languages necessary to complete the course: Slovak, English	
Notes:	

Past grade distribution
Total number of evaluated students: 80

A	B	C	D	E	FX
77,5	5,0	1,25	2,5	0,0	13,75

Lecturers: doc. Mgr. Bronislava Brejová, PhD., doc. Mgr. Tomáš Vinař, PhD., Mgr. Askar Gafurov, PhD.

Last change: 27.10.2023

Approved by: doc. Mgr. Tomáš Vinař, PhD., prof. Mgr. Radoslav Harman, PhD.

COURSE DESCRIPTION

Academic year: 2026/2027

University: Comenius University Bratislava

Faculty: Faculty of Mathematics, Physics and Informatics

Course ID:	**Course title:**
FMFI.KEF/1-DAV-311/20	Big Data Analysis in Physics

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

Number of credits: 7

Recommended semester: 5.

Educational level: I.

Prerequisites: FMFI.KAMŠ/1-DAV-112/20 - Calculus (2)

Course requirements:
Continuing evaluation: solving assignments
Scale of assessment (preliminary/final): 100/0

Learning outcomes:
Students will get acquainted with tasks solved in physics and technical practice, which require processing of large data files. They will learn the basic algorithms for solving problems, methods of obtaining numerical data, their visualization and qualitative evaluation.

Class syllabus:
Partial differential equations - heat conduction equations, wave equation, Dynamical systems - nonlinear systems (deterministic chaos, fractals), dynamics of N bodies. Methods of statistical physics - molecular dynamics, simulated annealing, Monte Carlo methods, evolutionary algorithms. Random matrix theory.

Recommended literature:
Numerical recipes : The art of scientific computing / W. H. Press ... [et al.] New York : Cambridge University Press, 1986
Numerické metody / Emil Vitásek. Praha : Státní nakladatelství technické literatury, 1987
Monte Carlo simulation in statistical physics : An introduction / K. Binder, D. W. Heermann. Berlin : Springer, 1992
Understanding molecular simulation : From algorithms to applications / Daan Frenkel, Berend Smit. San Diego : Academic Press, 2002

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: prof. Ing. Roman Martoňák, DrSc.

Last change: 15.03.2022

Approved by: doc. Mgr. Tomáš Vinař, PhD., prof. Mgr. Radoslav Harman, PhD.

COURSE DESCRIPTION

Academic year: 2026/2027

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., I.II.

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: 263					
A	B	C	D	E	FX
49,43	14,83	12,55	11,03	4,18	7,98
Lecturers: RNDr. Barbora Cimrová, PhD., doc. PhDr. Ján Rybár, PhD.					
Last change: 04.07.2022					
Approved by: doc. Mgr. Tomáš Vinař, PhD., prof. Mgr. Radoslav Harman, PhD.					

COURSE DESCRIPTION

Academic year: 2026/2027

University: Comenius University Bratislava

Faculty: Faculty of Mathematics, Physics and Informatics

Course ID:	**Course title:**
FMFI.KAMŠ/1-DAV-102/20	Calculus (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: 7

Recommended semester: 1.

Educational level: I.

Prerequisites:

Course requirements:
Continuous assessment:
i) short control tests (5-10 short test during discussion sessions) - together approx. 30% of total course points,
ii) midterm exam - approx. 30% of total course points
At least 30% of the points from the maximum of the continuous assessment are required to be admitted to the final exam.
Final examination: together approx. 40% of total course points, consists of written test and oral exam with equal weights
Scale of assessment (preliminary/final): 60/40

Learning outcomes:
In this course, students review their basic arithmetic skills and graphical representation of common functions. After completing it, students will be able to individually use the basic tools of mathematical analysis (elementary functions, complex numbers, derivatives and integrals) and gain knowledge about their applications and interpretation in real life.

Class syllabus:
Review of artimetics, algebraic operations, basic functions, trigonometry. Functions. Trigonometric, exponential, logarithmic and hyperbolic functions. Rational functions and limits. Complex numbers. Derivatives and their application. Series. Power series. Taylor expansion and approximation of functions. Plane curves and their fitting. Definite and indefinite integral and their applications.

Recommended literature:
K.A. Stroud, D.J Booth, Engineering Mathematics, Industrial Press Inc. New York, 7th Edition

Languages necessary to complete the course:
Slovak, English

Notes:

Past grade distribution Total number of evaluated students: 281					
A	B	C	D	E	FX
18,51	14,59	18,15	16,73	14,23	17,79
Lecturers: doc. Mgr. Richard Kollár, PhD., Mgr. Jakub Poljovka					
Last change: 24.06.2022					
Approved by: doc. Mgr. Tomáš Vinař, PhD., prof. Mgr. Radoslav Harman, PhD.					

COURSE DESCRIPTION

Academic year: 2026/2027

University: Comenius University Bratislava

Faculty: Faculty of Mathematics, Physics and Informatics

Course ID:	**Course title:**
FMFI.KAMŠ/1-DAV-112/20	Calculus (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: 7

Recommended semester: 2.

Educational level: I.

Prerequisites: FMFI.KAMŠ/1-DAV-102/20 - Calculus (1)

Recommended prerequisites:
1-DAV-111 Supplementary Discussion Session in Mathematics

Course requirements:
Continuous assessment: midterm exam - 50% of total course points
Final examination: 50% of total course points, written exam and oral exam with equal weights
Scale of assessment (preliminary/final): 50/50

Learning outcomes:
Upon completion of the course, students will be able to individually use the basic tools of advanced mathematical analysis (partial derivatives, integrals of several variables, special functions, vector differential calculus, ordinary differential equations and dynamical systems, Laplace transform and Fourier series) and they will gain knowledge about applications and interpretation of these tools in real life.

Class syllabus:
Partial derivatives. Integrals of several variables. Special functions. Vector differential calculus. Functional series. First and second order ordinary differential equations. Laplace transformation. Fourier series.

Recommended literature:
K.A. Stroud, D.J Booth, Engineering Mathematics, Industrial Press Inc. New York, 7th Edition
K.A. Stroud, D.J Booth, Advanced Engineering Mathematics, Palgrave MacMillan, New York, 5th Edition
S. Strogatz, Nonlinear Dynamics and Chaos, Westview 1994

Languages necessary to complete the course:
Slovak, English

Notes:

Past grade distribution Total number of evaluated students: 157					
A	B	C	D	E	FX
15,92	13,38	10,19	16,56	25,48	18,47
Lecturers: doc. Mgr. Richard Kollár, PhD.					
Last change: 24.06.2022					
Approved by: doc. Mgr. Tomáš Vinař, PhD., prof. Mgr. Radoslav Harman, PhD.					

COURSE DESCRIPTION

Academic year: 2026/2027

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., I.II.

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: 106

A	B	C	D	E	FX
67,92	11,32	8,49	0,94	0,0	11,32

Lecturers: doc. PhDr. Ján Rybár, PhD.

Last change: 17.05.2024

Approved by: doc. Mgr. Tomáš Vinař, PhD., prof. Mgr. Radoslav Harman, PhD.

COURSE DESCRIPTION

Academic year: 2026/2027

University: Comenius University Bratislava

Faculty: Faculty of Mathematics, Physics and Informatics

Course ID:	**Course title:**
FMFI.KI/1-INF-167/15	Computational Complexity and Computability

Educational activities:
Type of activities: lecture / practicals
Number of hours:
per week: 3 / 1 **per level/semester:** 39 / 13
Form of the course: on-site learning

Number of credits: 6

Recommended semester: 5.

Educational level: I.

Prerequisites:

Course requirements:
homework assignments, oral exam
Scale: A 90%, B 80%, C 70%, D 65%, E 60%

Learning outcomes:
Student will be familiar with basic concepts and results in computational complexity and computability theory.

Class syllabus:
RAM and its variants, register and Turing machines, recursive functions, computations and computability equivalence in different models. Church thesis, existence of undecidable problems. Basic complexity classes and relationships between them, existence of hard problems. NP-hardness, Cook theorem and selected important NP-complete problems, relationship between decision and optimization problems. P vs NP, different approaches to defining efficient algorithms (approximation and randomized algorithms). PSPACE-complete problems.

Recommended literature:
Computational complexity : A modern approach / Sanjeev Arora, Boaz Barak. New York : Cambridge University Press, 2009
Introduction to the Theory of Computation / Michael Sipser. Boston: Thomson, 2006

Languages necessary to complete the course:
Slovak, English

Notes:

Past grade distribution
Total number of evaluated students: 292

A	B	C	D	E	FX
33,9	10,96	14,04	12,33	16,78	11,99

Lecturers: doc. RNDr. Dana Pardubská, CSc.

Last change: 21.06.2022
Approved by: doc. Mgr. Tomáš Vinař, PhD., prof. Mgr. Radoslav Harman, PhD.

COURSE DESCRIPTION

Academic year: 2026/2027

University: Comenius University Bratislava

Faculty: Faculty of Mathematics, Physics and Informatics

Course ID:	**Course title:**
FMFI.KEF/1-AIN-140/22	Computer Principles - Hardware

Educational activities:
Type of activities: course
Number of hours:
per week: 5 **per level/semester:** 65
Form of the course: on-site learning

Number of credits: 7

Recommended semester: 1.

Educational level: I.

Prerequisites:

Course requirements:
Continuing evaluation: tests
At least 50% aggregate score from tests is required for the admission to the exam.
Exam: exam
Indicative grading scheme: A 90%, B 80%, C 72%, D 65%, E 60%
Supplementary classification in case of repair test - oral exam is possible.
Scale of assessment (preliminary/final): 70/30

Learning outcomes:
Students acquire essential knowledge of principles and properties of basic digital circuits. Gain practical experience to design and construct digital electronic devices and programing selected microprocessors and simple robotic systems.

Class syllabus:
Principles of circuits DDL, DTL and TTL
Boolean functions - combinatorial logical networks and their optimization
Selected combinatorial curcuits (adder, multiplexer, demultiplexer)
Physical implementation of automata (sequential circuits and their applications)
RS and D flip-flops, counter, shift register, three-state output, memory control R/W, parallel code converter, RS232 interface, static and dynamic RAMs and their organization
Microprocessors
Microprocessor structure
Arithmetic-logic unit (ALU) structure
Implementation of instructions and their classification
Addressing methods, internal and external memory
Auxiliary devices, their connection and data transfer, bus
Implementation of coupling circuits for memory and peripherals
Characteristics affecting computer performance, clock fequency, access time, transmission capacity, register size
Programming of single-chip microcomputers in higher and low-level programming language
Fundamentals of robotics, types of signals, their processing and control

Recommended literature:

P.Kaprálik, J.Galanová, M.Polakovič: Logické systémy, STU 2009 ISBN 978-80-227-3205-5
J. M. Bernard, J. Hugon: Od logických obvodu k mikroprocesorum I- IV SNTL, Praha 1984
Alan Clements: Principles of Computer Hardware, Oxford University Press, Fourth edition 2006, ISBN 0-19-927313-8
Logické systémy / Norbert Frištacký ... [et al.]. Bratislava : Alfa, 1990

Languages necessary to complete the course:

Slovak, English

Notes:

Past grade distribution

Total number of evaluated students: 554

A	B	C	D	E	FX
15,34	14,08	14,44	15,52	14,8	25,81

Lecturers: RNDr. Ján Greguš, PhD., doc. Ing. Maroš Gregor, PhD.

Last change: 27.06.2022

Approved by: doc. Mgr. Tomáš Vinař, PhD., prof. Mgr. Radoslav Harman, PhD.

COURSE DESCRIPTION

Academic year: 2026/2027

University: Comenius University Bratislava

Faculty: Faculty of Mathematics, Physics and Informatics

Course ID:	**Course title:**
FMFI.KI/2-INF-178/15	Cryptology (1)

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: 6

Recommended semester: 3.

Educational level: I., II.

Prerequisites:

Course requirements:
Homework assignments,
Condition for qualifying for the exam: timely and correctly solved all homework assignments,
Exam: written exam,
Approximate grading scale: A 92%, B 84%, C 76%, D 68%, E 60%
Scale of assessment (preliminary/final): 20/80

Learning outcomes:
The students will have the knowledge of basic cryptographic constructions; they will understand security guarantees provided by these constructions, and assumptions required for their security. The students will be able to choose a suitable cryptographic construction for given application / information system.

Class syllabus:
symmetric ciphers (block and stream ciphers), asymmetric ciphers, underlying problems for asymmetric constructions, hash functions, message authentication codes, digital signatures, passwords, secret sharing schemes, cryptographic protocols and related attacks, zero-knowledge proofs

Recommended literature:
Douglas R. Stinson, Maura Paterson: Cryptography: Theory and Practice, Chapman and Hall/ CRC; 4th edition, 2018
Nigel P. Smart: Cryptography Made Simple, Springer, 2016
Jean-Philippe Aumasson: Serious Cryptography: A Practical Introduction to Modern Encryption, 2017
Other on-line resources

Languages necessary to complete the course:
Slovak, English

Notes:

Past grade distribution Total number of evaluated students: 145					
A	B	C	D	E	FX
10,34	10,34	15,86	17,24	24,83	21,38
Lecturers: doc. RNDr. Martin Stanek, PhD.					
Last change: 28.06.2022					
Approved by: doc. Mgr. Tomáš Vinař, PhD., prof. Mgr. Radoslav Harman, PhD.					

COURSE DESCRIPTION

Academic year: 2026/2027

University: Comenius University Bratislava

Faculty: Faculty of Mathematics, Physics and Informatics

Course ID:	**Course title:**
FMFI.KAI/1-DAV-214/24	Data Analysis in Power BI

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: 3

Recommended semester: 4., 6.

Educational level: I.

Prerequisites:

Course requirements:
Work during semester (2x test, project)
Grade assignment: A 91%, B 81%, C 73%, D 66%, E 60%
Scale of assessment (preliminary/final): 100/0

Learning outcomes:
By completing the course, the student will gain knowledge and skills in using the Power BI tool, will be able to identify data sources, understand the ETL process, create a data model, and design a BI solution using the tool in a specific case. The student will present and explain their proposed solution.

Class syllabus:
The purpose of BI in the context of managerial work. Typical business problems, determination of indicators, metrics. Typical technical problems: heterogeneous systems, different data sources, non-uniform or inconsistent data models, data in time, data and information that are not directly in operational/transactional systems, different data quality in different systems, reporting limitations from operational/transactional systems, data in .xls(x) tables supplied by users.
Contingency table, reporting in a spreadsheet.
Transactional and analytical systems. Data, organization, facts and dimensions, data aggregation, data granularity.
Front-end analytical layer – Power BI, application window, Power Query editor, data sources.
Basic types of visualizations, their editing, saving, sharing, publishing, exporting.
Data loading, data transformation, data correction, basic data quality control.
Dimension creation, data model. Working with M.
Creating metrics, working with DAX
Merging and editing data sources (Merge and Append Queries), conditional columns
Analysis, drill down, drill lup, drill through.
Examples of specific solutions.

Recommended literature:

POUR, J. – MARYŠKA, M. – STANOVSKÁ, I. – ŠEDIVÁ, Z. 2018. Self Service Business Intelligence. Grada Publishing a. s. 2018.
LACKO, L. 2009. Business Intelligence v SQL Serveru 2008. Brno: Computer Press, 2009.
NOVOTNÝ O. – POUR J. – SLÁNSKÝ D. 2005. Business Intelligence. Jak využít bohatství ve vašich datech. Praha: Grada Publishing, 2005.
POUR, J. – NOVOTNÝ, O. – MARYŠKA, M. 2012. Business Intelligence v podnikové praxi. Professional Publishing 2012.
BEULEN, E. - DANS, M. A.: Data Analytics and Digital Transformation. Routledge New York, 2024.
HAERTZEN, D.: The Analytical Puzzle: Profitable Data Warehousing, Business Intelligence and Analytics Technics Publications, LLC; First edition, June 20, 2012.
HBR Guide to Data Analytics Basics for Managers Ebook + Tools, HBR 2018
TURBAN, E. – SHARDA, R. – ARNSSON, J. E. – KING, D. 2008. Business Intelligence: A Managerial Approach. Upper Saddle River: Pearson Prentice Hall, 2008.
TURBAN, E. – ARONSON, J. E. – LIANG, T. 2007. Decision Support and Business Intelligence Systems. Upper Saddle River: Pearson Prentice Hall, 2007.
Webové sídlo Akademickej knižnice UK – externé informačné zdroje prístupné pre UK: http://uniba.sk/o-univerzite/fakulty-a-dalsie-sucasti/akademicka-kniznica-uk/externe-informacne-zdroje/.
Ďalšie zdroje budú priebežne dopĺňané a aktualizované (vzhľadom na nové a dostupné zdroje).
https://www.selecthub.com/c/business-intelligence-tools
https://www.softwaretestinghelp.com/tools/25-important-business-intelligence-tools

Languages necessary to complete the course:
Slovak, English

Notes:
The course is open only when at least 5 students sign up for the course.

Past grade distribution
Total number of evaluated students: 12

A	B	C	D	E	FX
91,67	0,0	0,0	0,0	0,0	8,33

Lecturers: RNDr. Zuzana Kovačičová, PhD.

Last change: 14.01.2025

Approved by: doc. Mgr. Tomáš Vinař, PhD., prof. Mgr. Radoslav Harman, PhD.

COURSE DESCRIPTION

Academic year: 2026/2027

University: Comenius University Bratislava

Faculty: Faculty of Mathematics, Physics and Informatics

Course ID:	**Course title:**
FMFI.KAI/1-DAV-202/20	Data Management

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

Number of credits: 5

Recommended semester: 4.

Educational level: I., II.

Prerequisites:

Antirequisites: FMFI.KI+KAI/2-INF-185/15

Course requirements:
During semester: homework (45%), project proposal (5%).
Durig exam period: project and oral exam (50%). Grades A: 90..100, B: 80...89, C: 70...79, D: 60...69, E: 50...59, FX: 0..49. More information on the course website.
Scale of assessment (preliminary/final): 50/50

Learning outcomes:
Students will be able to process large data sets with general and specialized tools. They will also be able to present the methods used and visualize the results.

Class syllabus:
Reproducibility of computational analyses. Processing text files with UNIX tools. Basics of the Perl language. Databases and SQL. System R. Use of Python to automate data downloads and to process text data. Shared cluster computing and cloud infrastructure. Highly parallel computing tools.

Recommended literature:
Building bioinformatics solutions : with Perl, R, and MySQL / Conrad Bessant, Ian Shadforth, Darren Oakley. Oxford : Oxford University Press, 2009
The Data Science Design Manual / Steven S. Skiena. Springer 2017

Languages necessary to complete the course:
Slovak, English

Notes:

Past grade distribution
Total number of evaluated students: 227

A	B	C	D	E	FX
50,22	22,47	10,57	5,73	4,85	6,17

Lecturers: doc. Mgr. Bronislava Brejová, PhD., doc. Mgr. Tomáš Vinař, PhD., Mgr. Vladimír Boža, PhD.
Last change: 30.01.2026
Approved by: doc. Mgr. Tomáš Vinař, PhD., prof. Mgr. Radoslav Harman, PhD.

STATE EXAM DESCRIPTION

Academic year: 2026/2027	
University: Comenius University Bratislava	
Faculty: Faculty of Mathematics, Physics and Informatics	
Course ID: FMFI.KAI+KAMŠ/1-DAV-950/20	**Course title:** Data Science
Number of credits: 4	
Educational level: I.	
Learning outcomes: State examination required for completion of bachelor's degree in study program Data Science	
State exam syllabus: Fundamentals of discrete mathematics, calculus, algebra, probability and statistics. Programming. Design and analysis of algorithms and data structures. Data science methods.	
Last change: 15.03.2022	
Approved by: doc. Mgr. Tomáš Vinař, PhD., prof. Mgr. Radoslav Harman, PhD.	

COURSE DESCRIPTION

Academic year: 2026/2027

University: Comenius University Bratislava

Faculty: Faculty of Mathematics, Physics and Informatics

Course ID:	**Course title:**
FMFI.KAI/1-DAV-312/20	Data Science - Generic Subject

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

Number of credits: 6

Recommended semester: 5.

Educational level: I.

Prerequisites:

Course requirements:
Requirements will be given by hosting university rules.

Learning outcomes:
The student completes the course at a foreign university, thus expanding his knowledge, establishing contacts in his field, and improving his communication skills.

Class syllabus:
The course is intended only for students who complete part of their studies at foreign universities as part of student mobility, where they complete at least one course in the field of data science, or in a related field. The choice of the course is subject to the approval of the director of the study program.

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: doc. Mgr. Tomáš Vinař, PhD.

Last change: 11.03.2022

Approved by: doc. Mgr. Tomáš Vinař, PhD., prof. Mgr. Radoslav Harman, PhD.

COURSE DESCRIPTION

Academic year: 2026/2027

University: Comenius University Bratislava

Faculty: Faculty of Mathematics, Physics and Informatics

Course ID:	**Course title:**
FMFI.KAG+KI/1-DAV-105/20	Data Visualisation

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.KAI/1-DAV-202/20 - Data Management or FMFI.KAI+KDMFI/1-AIN-130/22 - Programming (1)

Recommended prerequisites:
Basic knowledge of the Python language

Course requirements:
Practical tasks (35%), group project (45%), quizzes (10%), oral exam (10%). More information on the course website.
Scale of assessment (preliminary/final): 90/10

Learning outcomes:
Students will get acquainted with the basics of data visualization. They will be able to interpret graphs, draw conclusions from them. They will be able to choose the appropriate chart type for given data and create the appropriate visualization using existing Python libraries.

Class syllabus:
Processing tabular data, data types (continuous, discrete, categorical), basic descriptive statistics (mean, median, quantiles, variance, correlation). Types of graphs for two-dimensional and multidimensional data (e.g. bar plot, pie chart, scatterplot, plotplot, histogram, parallel coordinates, contour lines, heatmaps). Dimensionality reduction methods. Display of special data types (time series, geographic data, networks and hierarchies, texts). Use of interactive elements. Human perception. Technical aspects (formats, tools). Choice of colors. Principles of data visualization, selection of a suitable type of graph, common errors in visualization. Interpretation of visualized data.

Recommended literature:
Information visualization : Perception for design / Colin Ware. Waltham : Morgan Kaufmann, 2013
Now you see it Simple visualization techniques for quantitative analysis / Stephen Few, Analytics Press, 2009
Cairo: The Truthful Art: Data, Charts, and Maps for Communication. New Riders; 1st edition, 2016.

Languages necessary to complete the course:
Slovak, English

Notes:

Past grade distribution
Total number of evaluated students: 181

A	B	C	D	E	FX
61,33	20,99	9,94	2,21	0,0	5,52

Lecturers: doc. Mgr. Bronislava Brejová, PhD., Mgr. Martin Halaj, Ing. Branislav Zigo

Last change: 30.01.2026

Approved by: doc. Mgr. Tomáš Vinař, PhD., prof. Mgr. Radoslav Harman, PhD.

COURSE DESCRIPTION

Academic year: 2026/2027

University: Comenius University Bratislava

Faculty: Faculty of Mathematics, Physics and Informatics

Course ID:	**Course title:**
FMFI.KI/1-DAV-301/24	Database Systems

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:

Course requirements:
During semester work on practicals, homeworks; final oral exam.
Grades: A 92%, B 84%, C 76%, D 68%, E 60%.

Learning outcomes:
Students will learn about common problems arising in usage and implementation of database systems and about techniques to deal with these problems. They will learn about the relational model from both theoretical and practical standpoint and get acquainted with principles of transactional systems. Students also learn basics skills in working with database systems and related technologies.

Class syllabus:
Relational model, relational query languages, SQL, theory of database design (functional dependencies, keys, normal forms). Writing and testing queries mostly in SQL. Transactions and their processing.
Creation of database interrelated database tables. Import and export of data, updates. Query optimization, indexes. Administration of database systems.

Recommended literature:
Foundations of databases / Serge Abiteboul, Richard Hull, Victor Vianu. Reading : Addison-Wesley, 1995
Database systems : The complete book / Hector Garcia-Molina, Jeffrey D. Ullman, Jennifer Widom. Upper Saddle River : Prentice-Hall, 2002
Postgres tutorial http://www.postgresqltutorial.com/

Languages necessary to complete the course:
Slovak, English

Notes:

Past grade distribution
Total number of evaluated students: 124

A	B	C	D	E	FX
56,45	23,39	6,45	5,65	1,61	6,45

Lecturers: doc. RNDr. Ján Mazák, PhD.

Last change: 16.09.2024

Approved by: doc. Mgr. Tomáš Vinař, PhD., prof. Mgr. Radoslav Harman, PhD.

COURSE DESCRIPTION

Academic year: 2026/2027

University: Comenius University Bratislava

Faculty: Faculty of Mathematics, Physics and Informatics

Course ID:	**Course title:**
FMFI.KI/1-INF-310/00	Design of Efficient Algorithms

Educational activities:
Type of activities: lecture / practicals
Number of hours:
per week: 3 / 1 **per level/semester:** 39 / 13
Form of the course: on-site learning

Number of credits: 6

Recommended semester: 4.

Educational level: I.

Prerequisites: FMFI.KI/1-INF-220/00 - Algorithms and Data Structures and (FMFI.KI/1-INF-160/00 - Introduction to Combinatorics and Graph Theory or FMFI.KAI+KI/1-DAV-101/20 - Discrete Mathematics)

Course requirements:
To complete the course, it is necessary to obtain at least 70% of points during the semester. The grade is based on a final written exam and an optional oral exam.
Scale of assessment (preliminary/final): 0/100

Learning outcomes:
Student will be able to apply basic methods of efficient algorithm design and to analyze time complexity of algorithms

Class syllabus:
Basic graph problems and their effective solutions (e.g. algorithms for finding the shortest paths, the minimum spanning trees, articulations and bridges in graphs)
Data structures (Union/Find-Set problem, interval trees, RMQ and LCA)
The principles of efficient algorithm design (including particular applications) (e.g. dynamic programming, greedy algorithms, balancedness and the choice of an appropriate data structure)
Algorithm for problems from other areas of informatics (e.g. string matching, convex hull, modular arithmetic)

Recommended literature:
Introduction to algorithms / Thomas H. Cormen ... [et al.]. Cambridge, Mass. : MIT Press, 2001

Languages necessary to complete the course:
Slovak, English

Notes:

Past grade distribution
Total number of evaluated students: 722

A	B	C	D	E	FX
38,92	19,39	15,1	13,99	9,56	3,05

Lecturers: Mgr. Michal Anderle, PhD., prof. RNDr. Rastislav Kráľovič, PhD., Mgr. Jozef Rajník, PhD.
Last change: 23.06.2022
Approved by: doc. Mgr. Tomáš Vinař, PhD., prof. Mgr. Radoslav Harman, PhD.

COURSE DESCRIPTION

Academic year: 2026/2027

University: Comenius University Bratislava

Faculty: Faculty of Mathematics, Physics and Informatics

Course ID:	**Course title:**
FMFI.KAI+KI/1-DAV-101/20	Discrete Mathematics

Educational activities:
Type of activities: course
Number of hours:
per week: 6 **per level/semester:** 78
Form of the course: on-site learning

Number of credits: 8

Recommended semester: 1.

Educational level: I.

Prerequisites:

Course requirements:
Continuous assessment: assessed homework, tests, written exams At least 50% of the points from the continuous assessment are required for admission to the examination. Exam: written, oral Exam weight: 50%
Scale of assessment (preliminary/final): 50/50

Learning outcomes:
This course will provide the mathematical foundations necessary for the study of computer science. Students will also learn mathematical culture, ways of thinking, reasoning and arguing in mathematics, as well as proof techniques. Specifically, the course will cover basic concepts, methods and algorithms from combinatorics, set theory, graph theory and logic.

Class syllabus:
Introduction to combinatorics and enumeration, basic combinatorial configurations, enumeration principles, basic combinatorial identities. Pascal's formula, binomial and polynomial theorem. Intuitive set theory and its paradoxes, basic set relations and operations on sets, cardinality of sets. Propositional logic, quantified propositions, basic methods of mathematical proofs. The principle of inclusion and exclusion and an introduction to discrete probability.
Relations and representations of relations (sets, graphs, matrices). Significant relations (equivalence, partial ordering). Graph theory, basic concepts and selected algorithms.

Recommended literature:
Discrete and combinatorial mathematics : An applied introduction / Ralph Grimaldi
Harlow : Pearson Education, 2014

Languages necessary to complete the course:
Slovak, English

Notes:

Past grade distribution
Total number of evaluated students: 270

A	B	C	D	E	FX
17,41	9,26	13,7	20,37	16,3	22,96

Lecturers: doc. RNDr. Edita Mačajová, PhD., doc. RNDr. Tatiana Jajcayová, PhD., Mgr. Jozef Rajník, PhD.

Last change: 15.03.2022

Approved by: doc. Mgr. Tomáš Vinař, PhD., prof. Mgr. Radoslav Harman, PhD.

COURSE DESCRIPTION

Academic year: 2026/2027

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

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. Mgr. Tomáš Vinař, PhD., prof. Mgr. Radoslav Harman, PhD.

COURSE DESCRIPTION

Academic year: 2026/2027

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., I.II., II.

Prerequisites:

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

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

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

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

Languages necessary to complete the course:

Notes:

Past grade distribution
Total number of evaluated students: 318

A	B	C	D	E	FX
77,36	8,81	4,4	1,26	0,94	7,23

Lecturers: Mgr. Aneta Barnes

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

COURSE DESCRIPTION

Academic year: 2026/2027

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., I.II., II.

Prerequisites:

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

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

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

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

Languages necessary to complete the course:

Notes:

Past grade distribution
Total number of evaluated students: 201

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

Lecturers: Mgr. Aneta Barnes

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

COURSE DESCRIPTION

Academic year: 2026/2027

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., I.II.

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.
Učebnica je nepublikovaná, k dispozícii v elektronickej podobe na webovej stránke KJP.
Anglický jazyk pre študentov FMFI UK : Aplikovaná matematika / Alexandra Maďarová, Ľubomíra Kožehubová.- učebnica publikovaná online
Anglický jazyk pre študentov FMFI UK : Matematika: Alexandra Maďarová, Eva Foltánová.
Učebnica je nepublikovaná, k dispozícii v elektronickej podobe na webovej stránke KJP.
Anglický jazyk pre študentov FMFI UK : Fyzika / Alena Zemanová.
Učebnica je nepublikovaná, k dispozícii v elektronickej podobe na webovej stránke KJP.
Anglický jazyk pre študentov FMFI UK : Informatika / Elena Klátiková.
Učebnica je nepublikovaná, k dispozícii v elektronickej podobe na webovej stránke KJP.

Languages necessary to complete the course:

Slovak, English

Notes:

Past grade distribution
Total number of evaluated students: 7538

A	B	C	D	E	FX
29,53	22,82	18,16	12,52	7,87	9,1

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

Last change: 16.09.2025

Approved by: doc. Mgr. Tomáš Vinař, PhD., prof. Mgr. Radoslav Harman, PhD.

COURSE DESCRIPTION

Academic year: 2026/2027

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., I.II.

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: Mgr. Ing. Jana Kočvarová, Mgr. Alexandra Maďarová, Mgr. Ľubomíra Kožehubová, Mgr. Eva Foltánová, Mgr. Aneta Barnes, Mgr. Simona Dobiašová, PhD., Mgr. Valéria Medárová, PhD.
Last change: 20.06.2022
Approved by: doc. Mgr. Tomáš Vinař, PhD., prof. Mgr. Radoslav Harman, PhD.

COURSE DESCRIPTION

Academic year: 2026/2027

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., I.II.

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.
Učebnica je nepublikovaná, k dispozícii v elektronickej podobe na webovej stránke KJP.
Anglický jazyk pre študentov FMFI UK : Aplikovaná matematika / Alexandra Maďarová, Ľubomíra Kožehubová.- učebnica publikovaná online
Anglický jazyk pre študentov FMFI UK : Matematika: Alexandra Maďarová, Eva Foltánová.
Učebnica je nepublikovaná, k dispozícii v elektronickej podobe na webovej stránke KJP.
Anglický jazyk pre študentov FMFI UK : Fyzika / Alena Zemanová.
Učebnica je nepublikovaná, k dispozícii v elektronickej podobe na webovej stránke KJP.
Anglický jazyk pre študentov FMFI UK : Informatika / Elena Klátiková.
Učebnica je nepublikovaná, k dispozícii v elektronickej podobe na webovej stránke KJP.

Languages necessary to complete the course:
Slovak, English

Notes:

Past grade distribution
Total number of evaluated students: 1461

A	B	C	D	E	FX
15,47	18,96	22,72	18,21	18,14	6,5

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

Last change: 16.09.2025

Approved by: doc. Mgr. Tomáš Vinař, PhD., prof. Mgr. Radoslav Harman, PhD.

COURSE DESCRIPTION

Academic year: 2026/2027

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., I.II.

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.
Učebnica je nepublikovaná, k dispozícii v elektronickej podobe na webovej stránke KJP.
Anglický jazyk pre študentov FMFI UK : Aplikovaná matematika / Alexandra Maďarová, Ľubomíra Kožehubová.- učebnica publikovaná online
Anglický jazyk pre študentov FMFI UK : Matematika: Alexandra Maďarová, Eva Foltánová.
Učebnica je nepublikovaná, k dispozícii v elektronickej podobe na webovej stránke KJP.
Anglický jazyk pre študentov FMFI UK : Fyzika / Alena Zemanová.
Učebnica je nepublikovaná, k dispozícii v elektronickej podobe na webovej stránke KJP.
Anglický jazyk pre študentov FMFI UK : Informatika / Elena Klátiková.
Učebnica je nepublikovaná, k dispozícii v elektronickej podobe na webovej stránke KJP.

Languages necessary to complete the course:
Slovak, English

Notes:

Past grade distribution
Total number of evaluated students: 4299

A	B	C	D	E	FX
25,17	28,15	21,61	11,82	6,05	7,21

Lecturers: Mgr. Ing. Jana Kočvarová, Mgr. Alexandra Maďarová, Mgr. Ľubomíra Kožehubová, Mgr. Eva Foltánová, Mgr. Aneta Barnes, Mgr. Simona Dobiašová, PhD., Mgr. Valéria Medárová, PhD.

Last change: 16.09.2025

Approved by: doc. Mgr. Tomáš Vinař, PhD., prof. Mgr. Radoslav Harman, PhD.

COURSE DESCRIPTION

Academic year: 2026/2027

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)

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: 756					
A	B	C	D	E	FX
58,86	20,77	10,71	6,08	2,78	0,79
Lecturers: doc. Mgr. Igor Melicherčík, PhD., Mgr. Radoslav Hurtiš, PhD.					
Last change: 20.06.2022					
Approved by: doc. Mgr. Tomáš Vinař, PhD., prof. Mgr. Radoslav Harman, PhD.					

COURSE DESCRIPTION

Academic year: 2026/2027

University: Comenius University Bratislava

Faculty: Faculty of Mathematics, Physics and Informatics

Course ID:	**Course title:**
FMFI.KI/1-INF-215/14	Formal Languages and Automata (1)

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: 6

Recommended semester: 3.

Educational level: I.

Prerequisites:

Course requirements:
homework, test, written and oral final exam
Scale of assessment (preliminary/final): 30/70

Learning outcomes:
Students will be familiar with basic models of automata and grammars, and they will be ale to compare their computational power. They will understand algorithmic problem (un)decidability and a formal definition of computational complexity of a problem.

Class syllabus:
Chomsky hierarchy of formal grammars. Finite state automata and pushdown automata. Basic properties of regular and context-free languages, regular expressions. Turing machines. Undecidable problems. Introduction to computational complexity theory.

Recommended literature:
The Mathematical theory of context free languages / Seymour Ginsburg. New York : McGraw Hill, 1966
Formálne jazyky a automaty / John E. Hopcroft, Jeffrey D. Ullmanm ; preložili Branislav Rovan, Peter Mikulecký. Bratislava : Alfa, 1978
Introduction to Automata Theory, Languages, and Computation / John E. Hopcroft, Rajeev Motwani, Jeffrey D. Ullman. Boston : Pearson/Addison-Wesley, 2007

Languages necessary to complete the course:
Slovak, English

Notes:

Past grade distribution
Total number of evaluated students: 789

A	B	C	D	E	FX
18,88	5,45	5,07	20,28	33,84	16,48

Lecturers: prof. RNDr. Branislav Rovan, PhD., doc. RNDr. Peter Kostolányi, PhD., Mgr. Andrej Ravinger
Last change: 08.02.2018
Approved by: doc. Mgr. Tomáš Vinař, PhD., prof. Mgr. Radoslav Harman, PhD.

COURSE DESCRIPTION

Academic year: 2026/2027

University: Comenius University Bratislava

Faculty: Faculty of Mathematics, Physics and Informatics

Course ID:	**Course title:**
FMFI.KI/2-INF-186/15	Formal Languages and Automata (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: 6

Recommended semester: 4.

Educational level: I., II.

Prerequisites:

Recommended prerequisites:
1-INF-215 and 1-INF-220

Course requirements:
Homework assignments and semester tests, final written and oral exam.
Scale of assessment (preliminary/final): 30/70

Learning outcomes:
Students are familiar with properties of all classes in the Chomsky hierarchy. They understand the concept of decidability and complexity and know decidability status of basic problems for individual classes of the Chomsky hierarchy. They are familiar with basic methods of syntactic analysis and their connection to deterministic push-down automata.

Class syllabus:
Regular languages (characterization by equivalence relations). Finite state transducers. Context-sensistive grammars, linear bounded automata. Properties of language classes in the Chomsky hierarchy. Decidable and undecidable problems in the Chomsky hierarchy. Deterministic context-free grammars and basic methods of syntactic analysis.

Recommended literature:
Introduction to Automata Theory, Languages, and Computation / John E. Hopcroft, Rajeev Motwani, Jeffrey D. Ullman. Boston : Pearson/Addison-Wesley, 2007
Gries, David. "Compiler construction for digital computers." Wiley (1971).

Languages necessary to complete the course:

Notes:

Past grade distribution
Total number of evaluated students: 117

A	B	C	D	E	FX
53,85	11,11	12,82	9,4	8,55	4,27

Lecturers: prof. RNDr. Branislav Rovan, PhD., doc. RNDr. Peter Kostolányi, PhD.
Last change: 10.02.2022
Approved by: doc. Mgr. Tomáš Vinař, PhD., prof. Mgr. Radoslav Harman, PhD.

COURSE DESCRIPTION

Academic year: 2026/2027

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., I.II., II.

Prerequisites:

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

Learning outcomes:

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

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

Languages necessary to complete the course:

Notes:

Past grade distribution
Total number of evaluated students: 499

A	B	C	D	E	FX
48,5	19,44	16,63	7,82	2,0	5,61

Lecturers: Mgr. Ľubomíra Kožehubová

Last change: 20.06.2022

Approved by: doc. Mgr. Tomáš Vinař, PhD., prof. Mgr. Radoslav Harman, PhD.

COURSE DESCRIPTION

Academic year: 2026/2027

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., I.II., II.

Prerequisites:

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

Learning outcomes:

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

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

Languages necessary to complete the course:

Notes:

Past grade distribution
Total number of evaluated students: 307

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

Lecturers: Mgr. Ľubomíra Kožehubová

Last change: 20.06.2022

Approved by: doc. Mgr. Tomáš Vinař, PhD., prof. Mgr. Radoslav Harman, PhD.

COURSE DESCRIPTION

Academic year: 2026/2027

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., I.II., II.

Prerequisites:

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

Learning outcomes:

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

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

Languages necessary to complete the course:

Notes:

Past grade distribution
Total number of evaluated students: 128

A	B	C	D	E	FX
48,44	24,22	17,19	5,47	0,78	3,91

Lecturers: Mgr. Ľubomíra Kožehubová

Last change: 20.06.2022

Approved by: doc. Mgr. Tomáš Vinař, PhD., prof. Mgr. Radoslav Harman, PhD.

COURSE DESCRIPTION

Academic year: 2026/2027

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., I.II., II.

Prerequisites:

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

Learning outcomes:

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

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

Languages necessary to complete the course:

Notes:

Past grade distribution
Total number of evaluated students: 79

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

Lecturers: Mgr. Ľubomíra Kožehubová

Last change: 20.06.2022

Approved by: doc. Mgr. Tomáš Vinař, PhD., prof. Mgr. Radoslav Harman, PhD.

COURSE DESCRIPTION

Academic year: 2026/2027

University: Comenius University Bratislava

Faculty: Faculty of Mathematics, Physics and Informatics

Course ID:	**Course title:**
FMFI.KAI/1-AIN-301/22	Fundamentals of Computer Graphics and Image Processing

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: 6

Recommended semester: 5.

Educational level: I.

Prerequisites:

Antirequisites: FMFI.KAI+KAGDM/1-AIN-240/00

Course requirements:
Continuing evaluation: exercise assignments (50%).
Exam: written exam (50%).
To successfully complete the course, student has to obtain at least 50% of points on the exercise assignments and at least 50% on the final exam.
Final grade: A 90%, B 80%, C 70%, D 60%, E 50%.
Scale of assessment (preliminary/final): Continuing evaluation/Exam: 50/50.

Learning outcomes:
The graduate will master the basic techniques of image processing, such as basic image transformations, basic techniques of image preprocessing (image filtering, edge detection), basic principles of segmentation.
The graduate is familiar with the basics of modeling and rendering procedures, computer animation and multimedia, can implement selected graphics algorithms and understands their mathematical background.

Class syllabus:
Rendering of 3D graphics, calculation of light and shadows, photorealism.
Representations of 3D objects (parametric, polygonal).
Modeling techniques (box modeling, parametric modeling, procedural).
Computer animation (keyframe technique, tweening, procedural animation)
Color spaces, additive and subtractive color models. Color depth.
Raster and vector graphics. 2D graphic formats.
Multimedia, 2D image compression, video compression, codecs.
Computer graphics applications: industrial and graphic design, computer games, virtual reality, scientific visualization.
Image digitization and its properties
Image preprocessing (image filtering, edge detection)
Segmentation (basic approaches)

Case studies (selected topics)

Recommended literature:
Digital image processing / Rafael C. Gonzalez, Richard E. Woods. Upper Saddle River : Prentice-Hall, 2002
Hughes: Computer Graphics Principles and Practice, ISBN: 978-0-321399-52-6

Languages necessary to complete the course:
Slovak, English

Notes:

Past grade distribution
Total number of evaluated students: 181

A	B	C	D	E	FX
17,68	24,86	28,18	18,23	6,08	4,97

Lecturers: doc. RNDr. Martin Madaras, PhD., RNDr. Zuzana Berger Haladová, PhD.

Last change: 27.06.2022

Approved by: doc. Mgr. Tomáš Vinař, PhD., prof. Mgr. Radoslav Harman, PhD.

COURSE DESCRIPTION

Academic year: 2026/2027

University: Comenius University Bratislava

Faculty: Faculty of Mathematics, Physics and Informatics

Course ID:	**Course title:**
FMFI.KAFZM/1-OZE-303/22	Fundamentals of Meteorology and Climatology

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: 6.

Educational level: I.

Prerequisites:

Course requirements:
Preliminary evaluation: independent work
Final exam: oral / written
Indicative evaluation scale: A 90%, B 80%, C 70%, D 60%, E 50%
Scale of assessment (preliminary/final): 0/100

Learning outcomes:
After completing the course, students will gain basic information from meteorology and climatology.

Class syllabus:
The students gain knowledge of solar radiation, its transformation in the atmosphere, the composition of the atmosphere and its vertical structure, the total net radiation balance of the Earth-atmosphere system. Humidity characteristics, phase transitions, water vapor, water, ice and subcooled water. Vertical stability in the atmosphere, dry and saturated adiabatic gradient, standard atmosphere model. Basic features of general circulation, pressure formations and their genesis, forces acting in these formations. Frontal line, weather conditions on atmospheric fronts. Daily and annual course of meteorological elements. Local circulation systems. Climato-geographic factors, climate classification…

Recommended literature:
Meteorológia a klimatológia / S.P. Chromov (preložil J.Tomlain)/ Vydavateľstvo SAV Bratislava, 1968, 456 strán
Atmospheric Science / John M. Wallace, Peter V. Hobbs / Series: International Geophysics / Publisher: Academic Press, Year: 2006
Climatology / Robert V. Rohli, Anthony J. Vega / Publisher: Jones & Bartlett, Year: 2018
Netopil, R. et al.: Fyzická geografie 1. SPN, Praha 1984, 272 s.
Peixoto, J.P., Oort, A.H.: Physics of Climate. AIP Press, Springer, New York 1992, 520 pp.

Languages necessary to complete the course:
Slovak, English

Notes:					
Past grade distribution Total number of evaluated students: 81					
A	B	C	D	E	FX
34,57	33,33	17,28	11,11	3,7	0,0
Lecturers: doc. RNDr. Martin Gera, PhD.					
Last change: 15.03.2022					
Approved by: doc. Mgr. Tomáš Vinař, PhD., prof. Mgr. Radoslav Harman, PhD.					

COURSE DESCRIPTION

Academic year: 2026/2027

University: Comenius University Bratislava

Faculty: Faculty of Mathematics, Physics and Informatics

Course ID:	**Course title:**
FMFI.KTF/1-MAT-815/00	Fundamentals of Physics (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: 3.

Educational level: I.

Prerequisites: FMFI.KMANM/1-MAT-250/22 - Mathematical Analysis (4) or FMFI.KAMŠ/1-DAV-102/20 - Calculus (1) or FMFI.KMANM/1-INF-150/22 - Mathematical Analysis (2)

Recommended prerequisites:
1-MAT-150 Mathematical analysis (2) AND 1-MAT-160 Linear algebra and geometry (2)

Course requirements:
Semester grading based on homework.
Informative grading scale: A 90%, B 80%, C 70%, D 60%, E 50%
Scale of assessment (preliminary/final): 100/0

Learning outcomes:
The course will enable the students to understand the basic physics concepts, terminology and notation, as well as the importance and usage of these. They will be familiar with the most important physics approaches and problems, they will know how to solve these and will be able to interpret them. They will have the necessary skills to independently study the basic physics and technical literature. The first semester concentrates on topics from mechanics, however students will be able to understand problems from other areas of physics as well.

Class syllabus:
kinematics and dynamics of a point mass, Newton laws of motion, potential forces, harmonic oscillator, central potentials, collisions, two body problem a and many body problem, dynamics of collections of point masses, waves and oscillations, inertial and non-inertial reference frames, laws of motion in non-inertial reference frames, introduction to special theory of relativity; it is possible to include different topics according to needs and interests of the students

Recommended literature:
Feynmanovy přednášky z fyziky s řešenými příklady 1/3 / Richard P. Feynman, Robert B. Leighton, Matthew Sands. Havlíčkův Brod : Fragment, 2001
Lecture notes by the lecturer available at the website of the course.

Languages necessary to complete the course:
Slovak, English

Notes:

Past grade distribution Total number of evaluated students: 96					
A	B	C	D	E	FX
69,79	11,46	14,58	3,13	0,0	1,04
Lecturers: doc. Mgr. Juraj Tekel, PhD.					
Last change: 15.03.2022					
Approved by: doc. Mgr. Tomáš Vinař, PhD., prof. Mgr. Radoslav Harman, PhD.					

COURSE DESCRIPTION

Academic year: 2026/2027

University: Comenius University Bratislava

Faculty: Faculty of Mathematics, Physics and Informatics

Course ID:	**Course title:**
FMFI.KTF/1-MAT-825/00	Fundamentals of Physics (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.KTF/1-MAT-815/00 - Fundamentals of Physics (1) or FMFI.KAMŠ/1-DAV-112/20 - Calculus (2)

Recommended prerequisites:
1-MAT-815 Fundamentals of physics (1) AND 1-MAT-250 Mathematical analysis (4) AND 1-MAT-310 Ordinary differential equations (1)

Course requirements:
Semester grading based on homework.
Informative grading scale: A 90%, B 80%, C 70%, D 60%, E 50%
Scale of assessment (preliminary/final): 100/0

Learning outcomes:
The course will enable the students to understand and find their way in a wide range of various areas of physics. They will understand the basic concepts and terminology in these areas and will be familiar with the most important problems. They will have the necessary skills for independent study of more advanced literature, including research papers.

Class syllabus:
Lagrange formulation of classical mechanics, least action principle, selected topics from hydrodynamics, Euler and Navier-Stokes equations, electrostatics, electric currents, magnetism, Maxwell equations, scalar and vector potentials, theory of electromagnetic field and electrodynamics, quantum mechanics - formulation and most important results; it is possible to include different topics according to needs and interests of the students

Recommended literature:
Feynmanovy přednášky z fyziky s řešenými příklady 2/3 / Feynman, Leighton, Sands. Praha : Fragment, 2001
Lecture notes by the lecturer available at the website of the course.

Languages necessary to complete the course:
Slovak, English

Notes:

Past grade distribution
Total number of evaluated students: 27

A	B	C	D	E	FX
88,89	0,0	11,11	0,0	0,0	0,0

Lecturers: doc. Mgr. Juraj Tekel, PhD.

Last change: 15.03.2022

Approved by: doc. Mgr. Tomáš Vinař, PhD., prof. Mgr. Radoslav Harman, PhD.

COURSE DESCRIPTION

Academic year: 2026/2027

University: Comenius University Bratislava

Faculty: Faculty of Mathematics, Physics and Informatics

Course ID:	**Course title:**
FMFI.KAMŠ/1-DAV-201/20	Fundamentals of Probability and Statistics

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: 6

Recommended semester: 3.

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

Prerequisites:

Antirequisites: FMFI.KAMŠ/2-INF-175/18

Course requirements:
Teaching period: written exams
Examination period: combined written and oral exam
Examination period weight: 70%
Evaluation (in %): A (100-91), B (90-81), C (80-71), D (70-61), E (60-51), Fx (50-0)
Scale of assessment (preliminary/final): 30/70

Learning outcomes:
After finishing the course the students understand the mathematical foundations of probability and statistics. They can solve the most common types of probabilistic problems and execute the simplest statistical analyses.

Class syllabus:
Random events and probability, Independence of events, Conditional probability, General random variables, Distribution function, Discrete random variables and their basic types, Continuous random variables and their basic types, Numerical characteristics of random variables (for instance the mean value and the variance), Random vectors, Correlation and dependence of random variables, Law of large numbers, Central limit theorem, Introduction to the random variates generation, Introduction to the probabilistic information theory, Statistical inference for the simple random sample, Statistical inference for a pair of random samples, Statistical inference for the regression line, The fundamental principle of Monte-Carlo methods.

Recommended literature:
Probability and random processes / Geoffrey R. Grimmett, David R. Stirzaker. Oxford : Oxford University Press, 2001
Electronic materials of the lecturer

Languages necessary to complete the course:
Slovak, English

Notes:

Past grade distribution
Total number of evaluated students: 718

A	B	C	D	E	FX
19,64	11,7	14,35	21,45	22,7	10,17

Lecturers: Mgr. Pál Somogyi, PhD., prof. Mgr. Radoslav Harman, PhD., doc. Mgr. Lenka Filová, PhD., Dr. rer. nat. Tatiana Kossaczká, MSc.

Last change: 21.06.2022

Approved by: doc. Mgr. Tomáš Vinař, PhD., prof. Mgr. Radoslav Harman, PhD.

COURSE DESCRIPTION

Academic year: 2026/2027

University: Comenius University Bratislava

Faculty: Faculty of Mathematics, Physics and Informatics

Course ID:	**Course title:**
FMFI.KAFZM/1-OZE-374/15	Geographical Information Systems

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: 6.

Educational level: I.

Prerequisites:

Recommended prerequisites:
-

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

Learning outcomes:
Students will gain basic knowledge about working with geographical information systems and the possibilities of their use in the field of renewable energy sources, environmental physics, meteorology, hydrology and climatology.

Class syllabus:
Introduction to geographical information systems (GIS). Familiarity with GIS tools: location and attribute queries, map algebra, distance analysis, terrain model analysis, process modeling. Some examples of the use of GIS resources in the study and modeling of selected processes in the field of renewable energy sources, environmental physics, meteorology, hydrology and climatology. Digital terrain model, the dependence of the intensity of direct sunlight on the slope and orientation of the slopes. Use of linear regression in creating map layers.

Recommended literature:
The latest literature, sources from professional and scientific journals and information published on the Internet as recommended by the lecturer at the beginning of the semester
Older literature: Tuček, J., 1998: Geografické informační systémy. Princípy a praxe. Computer Press, Praha.

Languages necessary to complete the course:
Slovak in combination with English (some literature in English)

Notes:
-

Past grade distribution
Total number of evaluated students: 36

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

Lecturers: prof. RNDr. Milan Lapin, CSc.

Last change: 15.03.2022

Approved by: doc. Mgr. Tomáš Vinař, PhD., prof. Mgr. Radoslav Harman, PhD.

COURSE DESCRIPTION

Academic year: 2026/2027

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., I.II., II.

Prerequisites:

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

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

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

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

Languages necessary to complete the course:

Notes:

Past grade distribution
Total number of evaluated students: 874

A	B	C	D	E	FX
38,33	24,71	18,42	8,81	2,86	6,86

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

Last change: 05.09.2025

Approved by: doc. Mgr. Tomáš Vinař, PhD., prof. Mgr. Radoslav Harman, PhD.

COURSE DESCRIPTION

Academic year: 2026/2027

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., I.II., II.

Prerequisites:

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

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

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

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

Languages necessary to complete the course:

Notes:

Past grade distribution
Total number of evaluated students: 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: 05.09.2025

Approved by: doc. Mgr. Tomáš Vinař, PhD., prof. Mgr. Radoslav Harman, PhD.

COURSE DESCRIPTION

Academic year: 2026/2027

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., I.II., II.

Prerequisites:

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

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

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

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

Languages necessary to complete the course:

Notes:

Past grade distribution
Total number of evaluated students: 191

A	B	C	D	E	FX
45,03	23,04	19,37	6,81	2,09	3,66

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

Last change: 05.09.2025

Approved by: doc. Mgr. Tomáš Vinař, PhD., prof. Mgr. Radoslav Harman, PhD.

COURSE DESCRIPTION

Academic year: 2026/2027

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., I.II., II.

Prerequisites:

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

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

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

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

Languages necessary to complete the course:

Notes:

Past grade distribution
Total number of evaluated students: 104

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

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

Last change: 05.09.2025

Approved by: doc. Mgr. Tomáš Vinař, PhD., prof. Mgr. Radoslav Harman, PhD.

COURSE DESCRIPTION

Academic year: 2026/2027

University: Comenius University Bratislava

Faculty: Faculty of Mathematics, Physics and Informatics

Course ID:	**Course title:**
FMFI.KAG/1-MAT-460/00	Graph Theory

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

Number of credits: 3

Recommended semester: 3.

Educational level: I.

Prerequisites:

Course requirements:
Continuous evaluation: homewrok (20 p.)
Final exam: written (80 p.)
Grades: A 90%, B 80%, C 70%, D 60%, E 50%
Scale of assessment (preliminary/final): 20/80

Learning outcomes:
Understanding of an interplay of algebraic and discrete mathematical strucures, applications for solving concrete problems.

Class syllabus:
The automorphism group of a graph, constructions and properties of highly symmetric graphs. Symmetry and patterns, enumeration of patterns. Independent sest and cliques. Turan's theorem and extremal graphs, colorings of graphs and Ramsey's theorem. The probabilistic method, existence of a given structure, typical properties of graphs.

Recommended literature:
J. Plesník: Grafové algoritmy, Veda, Bratislava, 1983
J.A. Bandy, U.S.R. Murphy: Graph Theory with Applications, North-Holland, New York - Amsterdam - London, 1976

Languages necessary to complete the course:
slovak, english

Notes:

Past grade distribution
Total number of evaluated students: 77

A	B	C	D	E	FX
68,83	3,9	15,58	6,49	1,3	3,9

Lecturers: prof. RNDr. Róbert Jajcay, DrSc., doc. RNDr. Martin Mačaj, PhD.

Last change: 19.06.2022
Approved by: doc. Mgr. Tomáš Vinař, PhD., prof. Mgr. Radoslav Harman, PhD.

COURSE DESCRIPTION

Academic year: 2026/2027

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., 3.

Educational level: I., I.II.

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: 124

A	B	C	D	E	FX
76,61	17,74	4,03	0,0	0,0	1,61

Lecturers: Mgr. Ľudmila Hlinová

Last change: 15.03.2022

Approved by: doc. Mgr. Tomáš Vinař, PhD., prof. Mgr. Radoslav Harman, PhD.

COURSE DESCRIPTION

Academic year: 2026/2027

University: Comenius University Bratislava

Faculty: Faculty of Mathematics, Physics and Informatics

Course ID:	**Course title:**
FMFI.KAI/1-DAV-313/20	Internship

Educational activities:
Type of activities: practice
Number of hours:
per week: **per level/semester:** 300s
Form of the course: on-site learning

Number of credits: 10

Recommended semester: 5., 6..

Educational level: I.

Prerequisites:

Course requirements:
Before starting the internship (minimum of 300 working hours), the student will apply for approval of the content of the internship. At the end of the internship, the student submits a summary report confirmed by the employer.
Scale of assessment (preliminary/final): 100/0

Learning outcomes:
Students will get acquainted with the work environment and will be given the opportunity to apply the knowledge gained in other courses to real-life problems.

Class syllabus:
The student completes the internship to the extent required.

Recommended literature:

Languages necessary to complete the course:
Slovak, English

Notes:

Past grade distribution
Total number of evaluated students: 57

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

Lecturers: doc. Mgr. Tomáš Vinař, PhD.

Last change: 03.09.2025

Approved by: doc. Mgr. Tomáš Vinař, PhD., prof. Mgr. Radoslav Harman, PhD.

COURSE DESCRIPTION

Academic year: 2026/2027

University: Comenius University Bratislava

Faculty: Faculty of Mathematics, Physics and Informatics

Course ID:	**Course title:**
FMFI.KAI/1-AIN-304/22	Introduction to Artificial Intelligence

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: 6

Recommended semester: 5.

Educational level: I.

Prerequisites:

Course requirements:
The course assessment consists of three parts: exercises (30%), semestral exams (20%), and final exam (50%). Student should get at least half of the achievable points from both exercises and the semestral exams, in order to meet the minimal condition to sit 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): Practical work 50% (30% exercises + 20% tests) / 50% final exam.

Learning outcomes:
The course covers the basics of symbolic and nature-inspired methods of artificial intelligence. The objective is to provide the students with insight into the area of problem-solving by means of Artificial Intelligence. Theory is combined with practical exercises. Gained knowledge and skills can be further extended in the related master programmes.

Class syllabus:
In the first half of the course, we provide the description of simple rational agents, logical agents, uninformed and informed search in the solution space, the basics of game theory, problems with restrictive conditions, optimization, more complex agents capable of inference including the propositional logic and inference using the knowledge base. In the second half of the course, we tackle learning from examples: supervised learning, classification and regression, multilayer feedforward neural network and its applications, model selection, generalization, unsupervised learning and self-organization. We also introduce some nonparametric models, like K-means clustering and K-nearest neighbour method.

Recommended literature:
[1] Russell, Stuart and Norvig, Peter: Artificial Intelligence: A Modern Approach (3rd Edition), Prentice Hall, USA, 2010.
[2] Návrat, Pavol a kol.: Umelá inteligencia (3. vydanie), Vydavateľstvo STU, Bratislava, 2015.

Languages necessary to complete the course:
English, Slovak

Notes:

Past grade distribution
Total number of evaluated students: 325

A	B	C	D	E	FX
15,38	17,23	24,62	21,54	9,85	11,38

Lecturers: Mgr. Štefan Pócoš, PhD., doc. RNDr. Mária Markošová, PhD., Mgr. Iveta Bečková, PhD.

Last change: 14.08.2025

Approved by: doc. Mgr. Tomáš Vinař, PhD., prof. Mgr. Radoslav Harman, PhD.

COURSE DESCRIPTION

Academic year: 2026/2027

University: Comenius University Bratislava

Faculty: Faculty of Mathematics, Physics and Informatics

Course ID:	**Course title:**
FMFI.KAG/1-MAT-495/00	Introduction to Coding Theory

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

Number of credits: 3

Recommended semester: 4.

Educational level: I.

Prerequisites:

Recommended prerequisites:
1-MAT-260 Algebra (2)

Course requirements:
Ongoing evaluation during the semester: homeworks, midterm
Final exam: written and oral
Approximative grade 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 fundamental theoretical and practical aspects of coding theory, data transmission in a noisy channel as well as the basic principles of protecting data against errors introduced in transmission or storage.

Class syllabus:
Introduction to Coding Theory and Cryptography. Coding theory for the "ideal" communication channel (definitions and examples, concepts of encoding and decoding, construction of some simple codes, the shortest code, block codes etc.) Introduction to the theory of error-correcting codes (the minimum distance of a nontrivial code, detection and correction of transmitted errors, information symbols and parity check symbols).
Introduction to the theory of linear codes. (generator matrix and parity check matrix).

Recommended literature:
Introduction to coding theory / Jacobus Hendricus van Lint. Berlin : Springer, 1999
J. Adámek: Coding theory, SNTL, Praha 1989 (in Czech)
Paul Garrett, The Mathematics of Coding Theory, Pearson Prentice Hall
Raymond Hill, A First Course in Coding Theory, Oxford
Steven Roman, Coding and Information Theory, Springer

Languages necessary to complete the course:
Slovak, English

Notes:

Past grade distribution Total number of evaluated students: 118					
A	B	C	D	E	FX
77,97	6,78	5,08	1,69	2,54	5,93
Lecturers: prof. RNDr. Róbert Jajcay, DrSc.					
Last change: 14.03.2022					
Approved by: doc. Mgr. Tomáš Vinař, PhD., prof. Mgr. Radoslav Harman, PhD.					

COURSE DESCRIPTION

Academic year: 2026/2027

University: Comenius University Bratislava

Faculty: Faculty of Mathematics, Physics and Informatics

Course ID:	**Course title:**
FMFI-FM.KEF/1-MMN-270/22	Introduction to Financial Management

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: 5

Recommended semester: 4.

Educational level: I.

Prerequisites:

Course requirements:
Continuous assessment: active participation in classes, continuous test, condition for the exam is min. 70% of the interim evaluation (i.e. 28 points)
Exam: written exam - theoretical and computational part
Scale of assessment (preliminary/final): 40/60

Learning outcomes:
To provide students with basic knowledge of the financial management of business entities, asset valuation and the basic ability to independently decide on the possibility of investing based on preferences and market conditions.

Class syllabus:
Introduction to the financial management: financial markets, investments, products, instruments, environment, value management of a business entity.
Financial statement analysis: ratios, cash flow analysis, comparative market analysis and trend analysis, critical financial statement analysis, bankruptcy and creditworthiness models, economic value added.
Risk and return: financial assets and their risks, required/expected return, measurement of isolated risk, portfolio risk, diversification and volatility of investment portfolios, security market line (SML), effective set, indifference curves, optimal portfolio, capital asset pricing model (CAPM).
Time value of money: future value, present value, annuity, perpetuity, effective annual interest rate (EAR), discount.
Valuation models: general valuation model, types and basic properties of securities, present value of the bond; yield, interest rate and reinvestment risk of bonds; valuation of preference and ordinary shares, discounted dividend model.
Weighted average cost of capital: price of individual components of capital, weighted average cost of capital (WACC), optimal capital budget.
Evaluation of capital investments: net present value of the project (NPV), internal rate of return of the project (IRR), profitability index of the project, project financing.

Evaluation based on ESG factors: sustainable investments, green investments, evaluation parameters of business entities.

Recommended literature:

Financial management. Theory and practice: Eugene F. Brigham, Michael C. Ehrhardt. Cengage Learning, 16th edition, 2019

Principles of Corporate Finance: Richard A. Brealey, Stewart C. Myers, Franklin Allen. McGraw Hill, 13th edition, 2019

Routledge Handbook of Social and Sustainable Finance: ed. Othmar M. Lehner. Routledge, 2018

Languages necessary to complete the course:

English

Notes:

Past grade distribution

Total number of evaluated students: 607

A	B	C	D	E	FX
21,91	29,32	21,09	12,19	10,71	4,78

Lecturers: doc. PhDr. Daniela Majerčáková, PhD., MBA

Last change: 15.03.2022

Approved by: doc. Mgr. Tomáš Vinař, PhD., prof. Mgr. Radoslav Harman, PhD.

COURSE DESCRIPTION

Academic year: 2026/2027

University: Comenius University Bratislava

Faculty: Faculty of Mathematics, Physics and Informatics

Course ID:	**Course title:**
FMFI.KI/1-INF-520/00	Introduction to Information Security

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: 6.

Educational level: I.

Prerequisites:

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

Learning outcomes:
The course provides an overview of information security, legal requirements for data protection and systems, threats and measures to eliminate the risks that arise from them. The student knows the classification of data, the method of risk analysis, the content of a security policy, the method of developing a security project as well as the basic standards and recommended procedures in the field of information security.

Class syllabus:
The role of information security. The major security attributes of information (confidentiality, availability, authenticity, integrity, privacy, etc.) Basic notions of information security (system, asset, threat, vulnerability, risk). Building a new or securing an existing IT system. Security projects (description of the system and of its environment, identification of relevant threats, qualitative risk analysis, contrameasures). Risk management (incident handling, disaster recovery, business continuity planning). Management of information security. Evaluation and certification of IT system/product. Introduction to cryptology and PKI.

Recommended literature:
1. Cybersecurity Body of Knowledge Resources & Publications (cybok.org)
2. NIST SP 800 series NIST Special Publication 800-series General Information
NIST
3. BSI Štandardy BSI - IT-Grundschutz (bund.de)
4. SO/IEC 27001 — Information security management systems — Requirements.
5. ISO/IEC 27002 — Code of practice for information security management.
6. ISO/IEC 27005 — Information security risk management.
7. Zákon č. 69/2018 Z. z. o kybernetickej bezpečnosti a o zmene a doplnení niektorých zákonov

8. Vyhláška Národného bezpečnostného úradu č. 362/2018, ktorou sa ustanovuje obsah bezpečnostných opatrení, obsah a štruktúra bezpečnostnej dokumentácie a rozsah všeobecných bezpečnostných opatrení
9. Zákon č. 95/2019 Z. z. o informačných technológiách vo verejnej správe a o zmene a doplnení niektorých zákonov
10. Vyhláška Úradu podpredsedu vlády Slovenskej republiky pre investície a informatizáciu č. 179/2020 Z. z., ktorou sa ustanovuje spôsob kategorizácie a obsah bezpečnostných opatrení informačných technológií verejnej správy

Languages necessary to complete the course:
Slovak, English

Notes:

Past grade distribution
Total number of evaluated students: 1120

A	B	C	D	E	FX
12,77	9,91	19,38	35,36	22,05	0,54

Lecturers: doc. RNDr. Daniel Olejár, PhD., RNDr. Michal Rjaško, PhD.

Last change: 15.03.2022

Approved by: doc. Mgr. Tomáš Vinař, PhD., prof. Mgr. Radoslav Harman, PhD.

COURSE DESCRIPTION

Academic year: 2026/2027

University: Comenius University Bratislava

Faculty: Faculty of Mathematics, Physics and Informatics

Course ID:	**Course title:**
FMFI.KDMFI/1-AIN-112/22	Introduction to Web Technologies

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: 6

Recommended semester: 1.

Educational level: I.

Prerequisites:

Antirequisites: FMFI.KZVI/1-AIN-610/00

Course requirements:
Intermediate assessment: practical assignments
Exam: practical (at least 70% of the semester points are needed)
Indicative evaluation scale: A 90%, B 80%, C 70%, D 60%, E 50%
Scale of assessment (preliminary/final): 20/80

Learning outcomes:
After completing the course, students will be able to create a correct web page (in HTML) with the correct structure and correctly formatted content. The design will be implemented using CSS and will be adapted to different devices (using MediaQueries or CSS framework). The pages will fulfil the basic conditions of accessibility for people with special needs.
Students will be introduced to the basics of JavaScript, which will allow them to work with HTML elements, edit CSS and work with forms.

Class syllabus:
- HTML: document structuring, content formatting elements, basic page elements including multimedia objects, code validation, tables, forms and their appropriate structuring.
- Cascading Style Sheets (CSS): properties and their values, selectors, pseudo-classes, properties for formatting fonts and text, tables and other objects, colors, backgrounds, lengths, units, box model, object placement, visual document formatting, styles for different devices, Media Queries, other CSS options with respect to current versions.
- Introduction to CSS frameworks, e.g. Bootstrap + responsive pages.
- Basic information on website accessibility.

Recommended literature:
actual documentation for each technology
w3schools.com
own electronic texts published on the website or in the Moodle environment

Languages necessary to complete the course:

Slovak, English

Notes:

Past grade distribution
Total number of evaluated students: 1754

A	B	C	D	E	FX
31,87	11,29	11,97	13,85	12,03	18,99

Lecturers: PaedDr. Roman Hrušecký, PhD.

Last change: 21.06.2022

Approved by: doc. Mgr. Tomáš Vinař, PhD., prof. Mgr. Radoslav Harman, PhD.

COURSE DESCRIPTION

Academic year: 2026/2027

University: Comenius University Bratislava

Faculty: Faculty of Mathematics, Physics and Informatics

Course ID:	**Course title:**
FMFI.KJFB/1-BMF-331/18	Introductory Biostatistics

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: 6.

Educational level: I.

Prerequisites:

Recommended prerequisites:
-

Course requirements:
Preliminary evaluation: homeworks
Final exam: oral / written written and oral exam
Indicative evaluation scale: A 90%, B 80%, C 70%, D 60%, E 50%
Scale of assessment (preliminary/final): 20/80

Learning outcomes:
On completion of the course, students will gain knowledge of the basic principles of scientific research methodology - they will be able to identify and apply different research types, and research designs. They will master the most commonly used statistical methods for biological and clinical data analysis and be able to work with statistical software and Excel add-ins.

Class syllabus:
Basic principles of scientific research methodology. Probability, random variable and its characteristics, types of probability distributions, basic concepts of applied statistics. Data collection, cleaning, sorting and coding, types, scales of variables, descriptive statistics, summarisation and presentation of data. Point and interval estimates, the concept of statistical hypothesis testing, P-value, interpretation of hypothesis testing results, statistical and biological significance. Analysis of categorical data, proportions, contingency tables, case classification, diagnostic tests. Comparison of sample means, t-tests. Analysis of variance. Nonparametric methods. Correlation and simple linear regression. Introduction to multivariable analysis. Practical part: solving real biomedical problems using statistical software Statsdirect and MS Excel with an add-in programmed in MS Visual Basic® for Application (VBA).

Recommended literature:
Lepš, J., Šmilauer, P. (2016). Biostatistika. Episteme, Nakladatelství JU, České Budějovice, 438 s. ISBN: 978-80-7394-587-9
Waczulíková, I., Slezák, P. (2015). Introductory Biostatistics. Bratislava: Comenius University, 1st Edition. 147 p. ISBN 978-80-223-3938-4.

Somorčík, J., Teplička, I. (2015). Štatistika zrozumiteľne. Bratislava : Enigma, 1. vydanie, 2015, 244 s. ISBN 9788081330421.
Zvárová J. (2011). Základy statistiky pro biomedicínské obory. Praha : Karolinum. 218 p. ISBN 80-7184-786-0
Motulsky, H. (2014). Intuitive Biostatistics. New York : Oxford University Press, 3rd Edition, 2014, 540 p. ISBN 987-0-19-994664-8.

Languages necessary to complete the course:

Notes:

Past grade distribution
Total number of evaluated students: 64

A	B	C	D	E	FX
64,06	25,0	6,25	4,69	0,0	0,0

Lecturers: prof. RNDr. Iveta Waczulíková, PhD., Mgr. Šimon Šutý, PhD.

Last change: 25.05.2025

Approved by: doc. Mgr. Tomáš Vinař, PhD., prof. Mgr. Radoslav Harman, PhD.

COURSE DESCRIPTION

Academic year: 2026/2027

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., I.II.

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: 172

A	B	C	D	E	FX
37,79	23,84	15,12	11,05	5,23	6,98

Lecturers: doc. PhDr. Ján Rybár, PhD.

Last change: 17.05.2024
Approved by: doc. Mgr. Tomáš Vinař, PhD., prof. Mgr. Radoslav Harman, PhD.

COURSE DESCRIPTION

Academic year: 2026/2027

University: Comenius University Bratislava

Faculty: Faculty of Mathematics, Physics and Informatics

Course ID:	**Course title:**
FMFI.KAG/1-DAV-104/20	Linear Algebra

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: 7

Recommended semester: 2.

Educational level: I.

Prerequisites:

Course requirements:
Ongoing evaluation during the semester: quizzes, homeworks, midterms
Final exam: written and oral
Approximative grade scale: A 90%, B 80%, C 70%, D 60%, E 50%
Scale of assessment (preliminary/final): 50/50

Learning outcomes:
Presentation of the basic concepts of algebraic methods with focus on their use in informatics.
After completing the course, students will be familar with the fundamentals of linear algebra needed in informatics and computer graphics, including the algorithms: Matrices and matrix operations, linear dependence and independence, dimension of a vector space, determinants, the concept of a group, specific matrix groups, systems of linear equations and their solution, solution spaces, vector spaces, scalar product, orthogonal complement, linear transformtaions and their matrices, injectivity, surjectivity, linear and affine spaces, eigenvectors and eigenvalues

Class syllabus:
Systems of linear equations and the corresponding geometry, Gauss-Jordan elimination, matrix notation, vectors, matrix operations, inverse matrix, vector spaces, solutions spaces of homogeneous systems and their bases, linear dependence/independence, basis, dimension, rank of a matrix, linera transformations, kernel, image, scalar product, orthogonality, orthogonal projections, angle between vectors, orthogonal complement, Gram-Schmidt orthonormalization, determinant, characteristic polynomial, eigenvectors and eigenvalues, Laplace expansion, Cramer's rule, fileds, rings, permutations.

Recommended literature:
Lineárna algebra a geometria I / Július Korbaš. Bratislava : Univerzita Komenského, 2003
Lineárna algebra a geometria : Cesta z troch rozmerov s presahmi do príbuzných odborov / Pavol Zlatoš. Bratislava : Albert Marenčin, 2011
Applied linear algebra and matrix analysis / Thomas S. Shores. New York : Springer, 2007
Linear algebra done right / Sheldon Axler. New York : Springer, 1997

Languages necessary to complete the course:

Slovak, English

Notes:

Past grade distribution
Total number of evaluated students: 194

A	B	C	D	E	FX
15,98	15,46	19,07	22,16	13,92	13,4

Lecturers: prof. RNDr. Róbert Jajcay, DrSc., Mgr. Martin Niepel, PhD., Mgr. Štefánia Glevitzká

Last change: 15.03.2022

Approved by: doc. Mgr. Tomáš Vinař, PhD., prof. Mgr. Radoslav Harman, PhD.

COURSE DESCRIPTION

Academic year: 2026/2027

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: 890

A	B	C	D	E	FX
19,21	18,54	23,03	21,69	15,62	1,91

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

Last change: 14.07.2025

Approved by: doc. Mgr. Tomáš Vinař, PhD., prof. Mgr. Radoslav Harman, PhD.

COURSE DESCRIPTION

Academic year: 2026/2027

University: Comenius University Bratislava

Faculty: Faculty of Mathematics, Physics and Informatics

Course ID:	**Course title:**
FMFI.KAMŠ/1-PMA-215/15	Matrix Algebra for Statisticians

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-DAV-104/20 - Linear Algebra

Course requirements:
Evaluation based on: tests (teaching period), written and oral exam
Approximate grade thresholds: A 90%, B 80%, C 70%, D 60%, E 50%
Scale of assessment (preliminary/final): 40/60 (30 written exam + 30 oral exam)

Learning outcomes:
The students will deepen their knowledge of matrices and their properties. They will familiarize themselves with the concepts of matrix algebra that are necessary or useful for various methods of statistics and data analysis.

Class syllabus:
Block matrices, matrix as a linear mapping, systems of linear equations. Column and null space, rank, inverse matrix. Elimination and LU decomposition. Orthogonal matrices and QR decomposition. The space of matrices, matrix norm, trace. Generalized inverse and Moore-Penrose pseudoinverse. Projection matrices, least squares problem. Positive (semi)definite matrices. Eigenvalues and eigenvectors, matrix powers, spectral decomposition. Singular decomposition.

Recommended literature:
Rosa S, Harman R: Maticová algebra pre štatistiku a analýzu dát, electronic study materials, 2021;
Strang G: Linear Algebra and Learning From Data, Wellesley - Cambridge Press, 2019;
Harville D A: Matrix Algebra From a Statistician's Perspective, Springer, 1997

Languages necessary to complete the course:
Slovak, English

Notes:

Past grade distribution Total number of evaluated students: 198					
A	B	C	D	E	FX
26,26	20,2	19,19	15,15	15,66	3,54
Lecturers: Mgr. Samuel Rosa, PhD., prof. Mgr. Radoslav Harman, PhD.					
Last change: 21.06.2022					
Approved by: doc. Mgr. Tomáš Vinař, PhD., prof. Mgr. Radoslav Harman, PhD.					

COURSE DESCRIPTION

Academic year: 2026/2027

University: Comenius University Bratislava

Faculty: Faculty of Mathematics, Physics and Informatics

Course ID:	**Course title:**
FMFI.KAI+KI/1-BIN-301/15	Methods in Bioinformatics

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: 6

Recommended semester: 5.

Educational level: I., II.

Prerequisites:

Course requirements:
Homework assignments (30%), group project (10%), weekly quizzes (10%), written exam (50%). Grades: A 90%, B 80%, C 70%, D 60%, E 50%. More information on the course website.
Scale of assessment (preliminary/final): 50/50

Learning outcomes:
Students will be familiar with basic problems and methods in bioinformatics; they will be able to choose an appropriate method for a given biological problem and to interpret its results.

Class syllabus:
Basic concepts from molecular biology, algorithms and machine learning. Sequencing and assembling genomes. Gene finding. Sequence alignment. Evolutionary models and phylogenetic trees. Comparative and population genomics. RNA structure. Motif finding and gene expression analysis. Protein structure and function. Selected current topics.
Students of computer science programs will focus on computer science methods and mathematical modeling of the covered problems.

Recommended literature:
Biological sequence analysis : Probabilistic models of proteins and nucleic acids / Richard Durbin ... [et al.]. Cambridge : Cambridge University Press, 1998
Understanding bioinformatics / Marketa Zvelebil, Jeremy O. Baum. New York : Garland Science, 2008

Languages necessary to complete the course:
Slovak, English

Notes:

Past grade distribution
Total number of evaluated students: 263

A	B	C	D	E	FX
28,14	16,73	21,29	18,25	7,22	8,37

Lecturers: doc. Mgr. Bronislava Brejová, PhD., doc. Mgr. Tomáš Vinař, PhD., Mgr. Askar Gafurov, PhD.
Last change: 14.01.2025
Approved by: doc. Mgr. Tomáš Vinař, PhD., prof. Mgr. Radoslav Harman, PhD.

COURSE DESCRIPTION

Academic year: 2026/2027

University: Comenius University Bratislava

Faculty: Faculty of Mathematics, Physics and Informatics

Course ID:	**Course title:**
FMFI.KAI/1-AIN-472/22	Mobile Application Developement

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

Type, volume, methods and workload of the student - additional information
2hrs. lessons, 2hrs. exercises, homworks and excercises, no final exam

Number of credits: 6

Recommended semester: 5.

Educational level: I.

Prerequisites:

Recommended prerequisites:
no

Antirequisites: FMFI.KAI/1-AIN-472/15

Course requirements:
Grades: A 90%, B 80%, C 70%, D 60%, E 50%.
Scale of assessment (preliminary/final): 100% (30% exercises+ 70% homeworks) / 0% final exam

Learning outcomes:
Design of mobile applications using Kotlin language in Android Studio

Class syllabus:
- MIT App Inventor
- Activity, views, intents, fragments
- MVVM design pattern and JetPack
- Persistency
- Maps and location, gsm, wifi, gps
- Retrofit – REST Client
- Room – sql client
- Firebase
- sensor and sensor data

Recommended literature:
Neil Smyth: Android Studio 4.0 Development Essentials - Kotlin Edition, 2020
Bruce Eckel & Svetlana Isakova: Atomic Kotlin, 2021

Languages necessary to complete the course:
Slovak

Notes:

Past grade distribution
Total number of evaluated students: 172

A	B	C	D	E	FX
19,19	5,81	11,05	15,7	36,05	12,21

Lecturers: RNDr. Peter Borovanský, PhD.

Last change: 27.06.2022

Approved by: doc. Mgr. Tomáš Vinař, PhD., prof. Mgr. Radoslav Harman, PhD.

COURSE DESCRIPTION

Academic year: 2026/2027

University: Comenius University Bratislava

Faculty: Faculty of Mathematics, Physics and Informatics

Course ID:	**Course title:**
FMFI.KAMŠ/1-DAV-304/20	Network Science

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: 5

Recommended semester: 6.

Educational level: I., II.

Prerequisites:

Course requirements:
Intermittent assessment: homework (30%), project (15%), project presentation (5%)
Exam: written (50%)
To successfully complete the course, student has to obtain at least 50% of points on the final exam
Final grade: A 90%, B 80%, C 70%, D 60%, E 50%
Scale of assessment (preliminary/final): 50/50

Learning outcomes:
Complex systems can often be represented as a network of a number of interacting components. The aim of the course is to get explore examples of complex networks in applications in physics, informatics, biology and social sciences, as well as with algorithmic, computational and statistical methods for the analysis of their behavior.

Class syllabus:
1. Introduction to networks.
2. Basic concepts and algorithms in graph theory (optimal paths, optimal flows).
3. Measures and metrics on networks.
4. Structure of large networks.
5. Random network models and their characteristics (Erdős-Rényi, Watts-Strogatz, Barabási-Albert).
6. Dynamics on networks (evolutionary algorithms, percolation, epidemiological models, synchronization on networks).

Recommended literature:
Grafové algoritmy / Ján Plesník. Bratislava : Veda, 1983
Graphs, networks, and algorithms / Dieter Jungnicke. Berlin : Springer, 2005
A-L. Barabási, Network Science, 2015 , dostupné na webe (http://networksciencebook.com/).
M.E.J. Newman, Networks - An introduction , Oxford Univ Press, 2010.
D. Easley and J. Kleinberg, Networks, Crowds and Markets, Cambridge Univ Press, 2010, , dostupné na webe (https://www.cs.cornell.edu/home/kleinber/networks-book/)

Languages necessary to complete the course:

Slovak, English

Notes:

Past grade distribution
Total number of evaluated students: 125

A	B	C	D	E	FX
22,4	24,8	8,0	26,4	14,4	4,0

Lecturers: doc. Mgr. Richard Kollár, PhD., Mgr. Katarína Boďová, PhD.

Last change: 24.06.2022

Approved by: doc. Mgr. Tomáš Vinař, PhD., prof. Mgr. Radoslav Harman, PhD.

COURSE DESCRIPTION

Academic year: 2026/2027

University: Comenius University Bratislava

Faculty: Faculty of Mathematics, Physics and Informatics

Course ID:	**Course title:**
FMFI.KMANM/1-MAT-240/00	Numerical Mathematics (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: 4.

Educational level: I., II.

Prerequisites: FMFI.KMANM/1-MAT-150/00 - Mathematical Analysis (2) or FMFI.KMANM/1-INF-150/22 - Mathematical Analysis (2) or FMFI.KAMŠ/1-DAV-102/20 - Calculus (1)

Course requirements:
Preliminary assessment: 2 written tests 10 points each, individual work 10 points
Final examination: written exam for 50 points and oral exam for 20 points
Indicative assessment scale: A 88%, B 78%, C 68%, D 58%, E 48%
Scale of assessment (preliminary/final): 30/70

Learning outcomes:
After completing the course, students will be able to solve numerical mathematics problems from mathematical analysis, algebra, applied mathematics and practice using computers and available software.

Class syllabus:
Position of numerical mathematics in solving of real problems. Concept of stability. Errors and computational arithmetic. The solution of nonlinear equations. Solution of system nonlinear equations. Approximation of functions. Interpolation - Lagrange's and Newton's interpolation polynomial and their errors. Optimal selection of interpolations point. Chebyshev polynomials. Linear and cubic splines. The least square method. Numerical differentiation. Numerical quadrature.
The solution of simultaneous linear equations.

Recommended literature:
Lars Eldén, Linde Wittmeyer-Koch: Numerical analysis An Introduction ACADEMIC Press, INC, San Diego, 1990.
J. Babušíková, M. Slodička, J. Weisz : Numerická matematika , UK Bratislava, 1999 (skriptá).
S. Míka: Numerické metody algebry, SNTL Praha 1982.
P. Přikryl: Numerické metody matematické analýzy, SNTL Praha 1985.
A. Ralston: A first course in numerical analysis, New York, 1965.
R. L.Burden, J. D. Faires: Numerical Analysis, Cengage Learning, 2010.

Languages necessary to complete the course:

Slovak and English

Notes:

Past grade distribution
Total number of evaluated students: 1025

A	B	C	D	E	FX
19,02	21,85	21,56	15,61	18,83	3,12

Lecturers: Mgr. Jela Babušíková, PhD., RNDr. Patrik Mihala, PhD.

Last change: 21.06.2022

Approved by: doc. Mgr. Tomáš Vinař, PhD., prof. Mgr. Radoslav Harman, PhD.

COURSE DESCRIPTION

Academic year: 2026/2027

University: Comenius University Bratislava

Faculty: Faculty of Mathematics, Physics and Informatics

Course ID:	**Course title:**
FMFI.KAI/2-AIN-286/22	Ontologies and Knowledge Engineering

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:

Antirequisites: FMFI.KAI/2-AIN-286/15

Course requirements:
Semester: project (60pts), ongoing work assessment (20pts)
Exam: written exam (20pts)
Min. passing requirements: 50% from the semester and 50% from the exam
Indicative assessment scale: A 90%, B 80%, C 70%, D 60%, E 50%
Scale of assessment (preliminary/final): 80/20

Learning outcomes:
Students become acquainted with ontologies, with their role in data representation and sharing, with ontological representation and query languages, and with ontology engineering methodologies. They will also get acquainted with Semantic Web standards and with the principles and possibilities of publishing data in the Linked Open Data network, as well as the use of such data in knowledge-based applications.

Class syllabus:
- Ontologies and their applications
- Well-known ontologies
- Ontological representation languages (RDF, RDF Schema, OWL)
- Ontologies and databases
- SPARQL query language
- Linked Open Data network
- Ontology engineering
- Applications of ontologies in informatics

Recommended literature:
Staab, S. and Studer, R. eds., 2010. Handbook on ontologies. Springer Science & Business Media.
Allemang, D. and Hendler, J., 2011. Semantic web for the working ontologist: effective modeling in RDFS and OWL. Elsevier.
Selected relevant recent scientific papers.

Languages necessary to complete the course:
Slovak, English

Notes:

Past grade distribution
Total number of evaluated students: 28

A	B	C	D	E	FX
64,29	28,57	3,57	3,57	0,0	0,0

Lecturers: doc. RNDr. Martin Homola, PhD., Mgr. Júlia Pukancová, PhD.

Last change: 30.06.2022

Approved by: doc. Mgr. Tomáš Vinař, PhD., prof. Mgr. Radoslav Harman, PhD.

COURSE DESCRIPTION

Academic year: 2026/2027

University: Comenius University Bratislava

Faculty: Faculty of Mathematics, Physics and Informatics

Course ID:	**Course title:**
FMFI.KI/1-DAV-103/20	Operating Systems and Computer Networks

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:
Activity during lectures and exercises (50%), written test (50%). Activity during lectures and exercises (50%), written test (50%)
Approximate grading 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 have an overview of the principles of computer operation, the tasks and principles of operating systems and the principles of operation and secure use of computer networks and their services. They will also gain command line skills on the Linux operating system.

Class syllabus:
Basic concepts of computer systems (processor, memory, input-output devices).
Basic concepts of operating systems, processes, memory management, input and output management, file systems, access control, virtualization.
Basic concepts of computer networks, reference model OSI, TCP/IP, e-mail and web, security aspects.
Basics of using the command line in the Linux operating system. Users, groups, redirection, searching. File and folder management. Basic tools (vim, awk, sed, bash scripts).

Recommended literature:
Computer networks / Andrew S. Tanenbaum. Upper Saddle River : Prentice-Hall, 2003
Operating systems : Internals and design principles / William Stallings. Upper Saddle River : Pearson/Prentice Hall, 2005
Teachers' own electronic texts published on the course's web page.

Languages necessary to complete the course:
Slovak, English

Notes:

Past grade distribution Total number of evaluated students: 246					
A	B	C	D	E	FX
39,43	23,17	10,57	8,54	4,47	13,82
Lecturers: doc. RNDr. Daniel Olejár, PhD., RNDr. Jaroslav Janáček, PhD., Mgr. Marek Šuppa					
Last change: 22.06.2022					
Approved by: doc. Mgr. Tomáš Vinař, PhD., prof. Mgr. Radoslav Harman, PhD.					

COURSE DESCRIPTION

Academic year: 2026/2027

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., I.II., II.

Prerequisites:

Course requirements:

Learning outcomes:

Class syllabus:

Recommended literature:

Languages necessary to complete the course:

Notes:

Past grade distribution
Total number of evaluated students: 202

A	B	C	D	E	FX
89,6	1,49	1,49	0,0	2,97	4,46

Lecturers: Mgr. Xenia Daniela Poslon, PhD.

Last change: 06.09.2023

Approved by: doc. Mgr. Tomáš Vinař, PhD., prof. Mgr. Radoslav Harman, PhD.

COURSE DESCRIPTION

Academic year: 2026/2027

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., I.II., II.

Prerequisites:

Course requirements:

Learning outcomes:

Class syllabus:

Recommended literature:

Languages necessary to complete the course:

Notes:

Past grade distribution
Total number of evaluated students: 202

A	B	C	D	E	FX
89,6	1,49	1,49	0,0	2,97	4,46

Lecturers: Mgr. Xenia Daniela Poslon, PhD.

Last change: 06.09.2023

Approved by: doc. Mgr. Tomáš Vinař, PhD., prof. Mgr. Radoslav Harman, PhD.

COURSE DESCRIPTION

Academic year: 2026/2027

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., I.II.

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: 7493

A	B	C	D	E	FX
92,81	1,52	0,23	0,0	0,08	5,37

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, Mgr. Martina Maheľová, PaedDr. Lucia Ondrušová
Last change: 16.06.2022
Approved by: doc. Mgr. Tomáš Vinař, PhD., prof. Mgr. Radoslav Harman, PhD.

COURSE DESCRIPTION

Academic year: 2026/2027

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., I.II.

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: 5850

A	B	C	D	E	FX
95,61	1,5	0,14	0,09	0,05	2,62

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, Mgr. Martina Maheľová, PaedDr. Lucia Ondrušová
Last change: 15.03.2022
Approved by: doc. Mgr. Tomáš Vinař, PhD., prof. Mgr. Radoslav Harman, PhD.

COURSE DESCRIPTION

Academic year: 2026/2027

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., I.II.

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: 3440

A	B	C	D	E	FX
98,14	0,44	0,09	0,03	0,0	1,31

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, Mgr. Martina Maheľová, PaedDr. Lucia Ondrušová

Last change: 16.06.2022

Approved by: doc. Mgr. Tomáš Vinař, PhD., prof. Mgr. Radoslav Harman, PhD.

COURSE DESCRIPTION

Academic year: 2026/2027

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., I.II.

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: 2957

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, Mgr. Martina Maheľová, PaedDr. Lucia Ondrušová

Last change: 15.03.2022

Approved by: doc. Mgr. Tomáš Vinař, PhD., prof. Mgr. Radoslav Harman, PhD.

COURSE DESCRIPTION

Academic year: 2026/2027

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., I.II.

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: 2264

A	B	C	D	E	FX
98,63	0,35	0,09	0,0	0,0	0,93

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, Mgr. Martina Maheľová, PaedDr. Lucia Ondrušová

Last change: 15.03.2022

Approved by: doc. Mgr. Tomáš Vinař, PhD., prof. Mgr. Radoslav Harman, PhD.

COURSE DESCRIPTION

Academic year: 2026/2027

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., I.II.

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: 205

A	B	C	D	E	FX
94,63	0,49	0,49	0,0	0,0	4,39

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, Mgr. Martina Maheľová, PaedDr. Lucia Ondrušová

Last change: 15.03.2022

Approved by: doc. Mgr. Tomáš Vinař, PhD., prof. Mgr. Radoslav Harman, PhD.

COURSE DESCRIPTION

Academic year: 2026/2027

University: Comenius University Bratislava

Faculty: Faculty of Mathematics, Physics and Informatics

Course ID:	**Course title:**
FMFI.KAI+KAMŠ/1-DAV-302/20	Principles of Data Science

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:

Course requirements:
Continuing evaluation: homework assignments, project
Exam: combination of written and oral exam
Final grade: A 90%, B 80%, C 70%, D 60%, E 50%.
Specific rules will be announced by the lecturer on the website in the first week of the semester.
Scale of assessment (preliminary/final): 50/50

Learning outcomes:
Students will gain a complex view of data science. Students will be able to select proper tools for data processing and data analysis, interpret the results and assess the reliability of the results. Students will also familiarize themselves with social and ethics principles of the profession.

Class syllabus:
What is data science? (Question - Data - Explorative analysis - Modeling - Interpretation and visualization.) Acquiring and cleaning data (data sources, errors and artifacts, missing values, outliers). Explorative analysis using descriptive statistics, finding correlations, using visualization. Scores and rankings. The role of eigenvalues and eigenvectors in visualization and dimensionality reduction. Using statistical methods for finding atypical data points. Linear regression. Different approaches to mathematical modeling. Model evaluation (classification error, ROC, predictive models). Logistic regression. Nearest neighbor classification. Distance measures. Clustering. Examples of using complex machine learning methods for data analysis. Big data processing (filtering, sampling, parallel processing). Social and ethical implications.

Recommended literature:
The Data Science Design Manual / Steven S. Skiena. Springer 2017

Languages necessary to complete the course:
Slovak, English

Notes:

Past grade distribution
Total number of evaluated students: 109

A	B	C	D	E	FX
51,38	19,27	12,84	5,5	3,67	7,34

Lecturers: doc. Mgr. Tomáš Vinař, PhD., prof. Mgr. Radoslav Harman, PhD., Mgr. Vladimír Boža, PhD., Mgr. Samuel Rosa, PhD.

Last change: 26.08.2024

Approved by: doc. Mgr. Tomáš Vinař, PhD., prof. Mgr. Radoslav Harman, PhD.

COURSE DESCRIPTION

Academic year: 2026/2027

University: Comenius University Bratislava

Faculty: Faculty of Mathematics, Physics and Informatics

Course ID:	**Course title:**
FMFI.KI/1-INF-517/22	Principles of Software Design (1)

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: 3.

Educational level: I.

Prerequisites:

Course requirements:
During semester: homeworks (60 points).
Examination period: oral examination from a set of announced topics (60 bodov).
Grading scale: A: more than 110pts, B: more than 100pts, C: more than 90pts, D: more than 80pts, E: more than 72pts. Student has to get at least 20pts from homeworks.
Scale of assessment (preliminary/final): 50/50

Learning outcomes:
Students will get an overwiew of modern trends in software development; they can distinguish good and bad practices in programming and project management.

Class syllabus:
Software development methodologies, agile, lean, configuration management, git, requirements, object design, SOLID, dependency injection, UML, quality assurance, testing, refactoring, continuous integration

Recommended literature:

Languages necessary to complete the course:
Slovak, English

Notes:

Past grade distribution
Total number of evaluated students: 250

A	B	C	D	E	FX
23,2	18,0	17,6	18,0	8,0	15,2

Lecturers: doc. RNDr. Robert Lukoťka, PhD.

Last change: 07.02.2022

Approved by: doc. Mgr. Tomáš Vinař, PhD., prof. Mgr. Radoslav Harman, PhD.

COURSE DESCRIPTION

Academic year: 2026/2027

University: Comenius University Bratislava

Faculty: Faculty of Mathematics, Physics and Informatics

Course ID:	**Course title:**
FMFI.KI/1-INF-518/22	Principles of Software Design (2)

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: 5.

Educational level: I.

Prerequisites:

Course requirements:
During semester: homeworks (60 points).
Examination period: oral examination from a set of announced topics (60 bodov).
Grading scale: A: more than 110pts, B: more than 100pts, C: more than 90pts, D: more than 80pts, E: more than 72pts. Student has to get at least 20pts from homeworks.
Scale of assessment (preliminary/final): 50/50

Learning outcomes:
Students extends their overwiew of modern trends in software development; they can distinguish good and bad practices.

Class syllabus:
Programming paradigms, type checking, good practices handling concurrency and parallelism (immutable data structures, futures and promises, introduction to asynchronous programming), databases – types and guarantees, architecture, architectural styles and patterns, stateless services, documentation and maintanence, management of SW projects, SCRUM, estimations, lean startup.

Recommended literature:

Languages necessary to complete the course:

Notes:

Past grade distribution
Total number of evaluated students: 104

A	B	C	D	E	FX
17,31	19,23	23,08	20,19	9,62	10,58

Lecturers: doc. RNDr. Robert Lukoťka, PhD., RNDr. Jana Kostičová, PhD.

Last change: 03.02.2022

Approved by: doc. Mgr. Tomáš Vinař, PhD., prof. Mgr. Radoslav Harman, PhD.

COURSE DESCRIPTION

Academic year: 2026/2027

University: Comenius University Bratislava

Faculty: Faculty of Mathematics, Physics and Informatics

Course ID:	**Course title:**
FMFI.KAMŠ/1-PMA-551/22	Probability Distributions

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: 3.

Educational level: I.

Prerequisites: FMFI.KAMŠ/1-MAT-281/00 - Probability and Statistics (1) or FMFI.KAMŠ/1-UMA-302/22 - Probability Measure and Mathematical Statistics (1) or FMFI.KAMŠ/1-DAV-201/20 - Fundamentals of Probability and Statistics

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

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:
Students will gain knowledge of some discrete and continuous probability distributions. They will learn to derive the characteristics of individual distributions and estimate their parameters. They will be able to recognize common classes of probability distribution.

Class syllabus:
Theory of probability distributions. Characteristic functions, generating functions. Moments and moment generating functions. Classes of probability distributions. The most frequently used distributions and estimators of their parameters. Applications.

Recommended literature:
Ross S M: Introduction to probability models, [S.l.]: Academic Press, 2010;
Hogg R V, Tanis E A, Dale L: Probability and statistical inference, Harlow: Pearson Education, 2015

Languages necessary to complete the course:
Slovak, English

Notes:

Past grade distribution Total number of evaluated students: 81					
A	B	C	D	E	FX
43,21	22,22	17,28	4,94	9,88	2,47
Lecturers: Mgr. Lívia Rosová, PhD.					
Last change: 21.06.2022					
Approved by: doc. Mgr. Tomáš Vinař, PhD., prof. Mgr. Radoslav Harman, PhD.					

COURSE DESCRIPTION

Academic year: 2026/2027

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:
Jíří Anděl: Matematika náhody. Praha, MatfyzPress, 2000.

Languages necessary to complete the course:
Slovak, English

Notes:

Past grade distribution
Total number of evaluated students: 139

A	B	C	D	E	FX
71,22	12,95	6,47	3,6	1,44	4,32

Lecturers: doc. RNDr. Beáta Stehlíková, PhD.

Last change: 16.05.2024

Approved by: doc. Mgr. Tomáš Vinař, PhD., prof. Mgr. Radoslav Harman, PhD.

COURSE DESCRIPTION

Academic year: 2026/2027

University: Comenius University Bratislava

Faculty: Faculty of Mathematics, Physics and Informatics

Course ID:	**Course title:**
FMFI.KAI+KDMFI/1-AIN-130/22	Programming (1)

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

Number of credits: 9

Recommended semester: 1.

Educational level: I., I.II.

Prerequisites:

Antirequisites: FMFI.KAI/1-AIN-130/13

Course requirements:
Continuing evaluation: homework assignments (30%)
Exam: midterm (20%) , written exam (50%)
To successfully complete the course, student has to obtain at least 50% of points
Final grade: A 90%, B 80%, C 70%, D 60%, E 50%
Scale of assessment (preliminary/final): 30/70

Learning outcomes:
Students will gain basic programming skills in the Python object-oriented programming language, become familiar with the basic data structures of the language, and gain their first skills with object-oriented programming.

Class syllabus:
Python programming language development environment;
programs, functions, recursion, modules;
data structures, lists, strings, files, dictionaries, sets;
graphical applications, events;
object-oriented programming, inheritance, polymorphism.

Recommended literature:
Summerfield: Programming in Python 3, Addison-Wesley Professional 2009
Miller: How to Think Like a Computer Scientist: Interactive Edition, web: http://interactivepython.org/runestone/static/thinkcspy/index.html

Languages necessary to complete the course:
slovak, english

Notes:

Past grade distribution
Total number of evaluated students: 1400

A	B	C	D	E	FX
27,64	10,5	10,86	7,5	11,64	31,86

Lecturers: RNDr. Andrej Blaho, PhD., PaedDr. Andrea Hrušecká, PhD., PaedDr. Daniela Bezáková, PhD., Mgr. Štefan Pócoš, PhD.

Last change: 26.06.2022

Approved by: doc. Mgr. Tomáš Vinař, PhD., prof. Mgr. Radoslav Harman, PhD.

COURSE DESCRIPTION

Academic year: 2026/2027

University: Comenius University Bratislava

Faculty: Faculty of Mathematics, Physics and Informatics

Course ID:	**Course title:**
FMFI.KAI+KDMFI/1-AIN-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: 7

Recommended semester: 2.

Educational level: I.

Prerequisites: FMFI.KAI+KDMFI/1-AIN-130/22 - Programming (1)

Course requirements:
Continuing evaluation: homework assignments (30%)
Exam: midterm (20%) , written exam (50%)
To successfully complete the course, student has to obtain at least 60% of points
Final grade: A 88%, B 81%, C 74%, D 67%, E 60%
Scale of assessment (preliminary/final): 30/70

Learning outcomes:
Students will be introduced to more advanced linked data structures and basic algorithms on these structures.

Class syllabus:
more advanced data structures: stacks, queues, linked lists, trees, graphs
various applications and basic algorithms with linked data structures
basic sorting, searching and generating algorithms

Recommended literature:
Miller, Ranum: Problem Solving with Algorithms and Data Structures using Python, Interactive Edition, web: http://interactivepython.org/runestone/static/pythonds/index.html

Languages necessary to complete the course:

Notes:

Past grade distribution
Total number of evaluated students: 1127

A	B	C	D	E	FX
34,78	12,87	11,27	9,23	13,75	18,1

Lecturers: RNDr. Andrej Blaho, PhD., Mgr. Štefan Pócoš, PhD.

Last change: 26.06.2022

Approved by: doc. Mgr. Tomáš Vinař, PhD., prof. Mgr. Radoslav Harman, PhD.

COURSE DESCRIPTION

Academic year: 2026/2027

University: Comenius University Bratislava

Faculty: Faculty of Mathematics, Physics and Informatics

Course ID:	**Course title:**
FMFI.KDMFI/1-AIN-171/22	Programming (3)

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

Type, volume, methods and workload of the student - additional information
Principles of Object Programming, Learning Programming Language C++, developing algorithmic skills, principles of agile programming , Training Test Driven Development Methodology, learning clean code programming and demonstrating errors we make.

Number of credits: 5

Recommended semester: 3.

Educational level: I.

Prerequisites:

Course requirements:
Continuing evaluation: homework assignments (40%))
Exam: written with oral consultation (33%)
Project: (27%)
To successfully complete the course, student has to obtain at least 75% of points on the homework assignement and to obtain at least 60% of points on the final exam.
Final grade: A 90%, B 86%, C 80%, D 70%, E 60%
Scale of assessment (preliminary/final): 40/60

Learning outcomes:
The students will be able to use learned algorithms to design object programs in C++ language, they will be able to solve practical assignments and independently propose and implement application in the language. They will be able to employ the methodology of test-driven programming.

Class syllabus:
Statements, variable types, arrays, multi-dimensional arrays
Functions, operators and their overloading
Pointers, arrays, pointers to pointers, pointers to functions
Global, local, static variables, type definitions
Structures, classes
Class hierarchy, abstract classes, dynamic inheritance, multiple inheritance
Class constructors and destructors
Function and method arguments, return values
Streams, work with files
Templates, STL, intelligent pointers
Exceptions

Parallelism

Recommended literature:

1. Virius, Miroslav, Jazyky C a C++, Grada, 2011
2. Virius, Miroslav, 1001 tipů a triků pro C++, Computer Press, a.s., Brno 2011
3. Sutter, Herb, Alexandrescu, Andrei, C++ - 101 programovacích technik, Addison-Wesley, Zoner Press, Brno, 2005
4. Eckel, Bruce, Myslíme v C++, Grada, 2000
5. Eckel, Bruce, Allison, Chuck, Myslíme v C++ (2. díl), Grada, 2006
6. Virius, Miroslav, Pasti a propasti jazyka C++, 2. aktualizované a rozšířené vydání, CP Books, Computer Press, Brno, 2005

Languages necessary to complete the course:
Slovak, English

Notes:

Past grade distribution
Total number of evaluated students: 1469

A	B	C	D	E	FX
40,3	13,34	10,42	9,39	10,76	15,79

Lecturers: Ing. František Gyarfaš, CSc., Mgr. Ivor Uhliarik, PhD.

Last change: 24.06.2022

Approved by: doc. Mgr. Tomáš Vinař, PhD., prof. Mgr. Radoslav Harman, PhD.

COURSE DESCRIPTION

Academic year: 2026/2027	
University: Comenius University Bratislava	
Faculty: Faculty of Mathematics, Physics and Informatics	
Course ID: FMFI.KAI+KDMFI/1-AIN-172/22	**Course title:** Programming (4)
Educational activities: **Type of activities:** course **Number of hours:** **per week:** 4 **per level/semester:** 52 **Form of the course:** on-site learning	
Type, volume, methods and workload of the student - additional information 2 hrs. lessons, 2 hrs. excersise	
Number of credits: 6	
Recommended semester: 4.	
Educational level: I.	
Prerequisites:	
Recommended prerequisites: 1-AIN-172 Programovanie (4)	
Course requirements: A 90%, B 80%, C 70%, D 60%, E 50% Scale of assessment (preliminary/final): 70% (homeworks, excercises, projekt) 30% (exam)	
Learning outcomes: design of algorithms in object-oriented environment, programming in JAVA and design of applications with the user's interface with JavaFX library	
Class syllabus: basic programming constructs of the language, comparison with C++ - basic data types and language components - fundamental JAVA libraries - linear data structures - object-orient programming in JAVA, classes, inheritance, interfaces - Java Collections - Java I/O, serialization - data structures and algorithms - threads and concurrent programs - design of applications with user's interface – JavaFX - Java Reflection Model	
Recommended literature: Eckel,B.: Thinking in Java, Prentice Hall, 1997 Goodrich,M.T, Tamassia,R.: Data Structures and Algorithms in Java, 3rd Ed., John Wiley & Sons, 2004 Herout,P.: Učebnice jazyka Java, Kopp,2003, Weiss M.A.: Data Structures & Problem Solving Using Java, Addison Wesley, 1998.	

Languages necessary to complete the course:
Slovak

Notes:

Past grade distribution
Total number of evaluated students: 920

A	B	C	D	E	FX
33,8	8,26	17,61	19,67	10,87	9,78

Lecturers: RNDr. Peter Borovanský, PhD.

Last change: 24.06.2022

Approved by: doc. Mgr. Tomáš Vinař, PhD., prof. Mgr. Radoslav Harman, PhD.

COURSE DESCRIPTION

Academic year: 2026/2027

University: Comenius University Bratislava

Faculty: Faculty of Mathematics, Physics and Informatics

Course ID:	**Course title:**
FMFI.KDMFI/1-AIN-302/22	Programming (5)

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: 6

Recommended semester: 5.

Educational level: I.

Prerequisites:

Recommended prerequisites:
1-AIN-210 Algorithms and data structures

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 will be able to solve problems in the C# programming language that require the design and use of custom data structures, object-oriented programming, and event-driven programming. They can evaluate the pros and cons of the C# programming language and compare it with other programming languages.

Class syllabus:
Introduction to C#
Basic data types and program constructs
Properties and events, input and output
Files, arrays, objects
Dynamic data structures
Graphics, multimedia
Comparison of C# with other programming languages
Comparison of C# algorithms and data structure implementations with other programming languages

Recommended literature:
Liberty, J., MacDonald, B.: Learning C# 3.0. ISBN: 970-0-596-52106-6
Albahari, J., Albahari, B.: C# 4.0 Pocket Reference. ISBN: 978-1-441-39401-1
www.edi.fmph.uniba.sk/~salanci/C/index.html

Any available information about C# programming

Languages necessary to complete the course:
Slovak, English

Notes:

Past grade distribution
Total number of evaluated students: 291

A	B	C	D	E	FX
71,48	4,81	6,53	5,84	6,87	4,47

Lecturers: doc. RNDr. Ľubomír Salanci, PhD.

Last change: 01.10.2025

Approved by: doc. Mgr. Tomáš Vinař, PhD., prof. Mgr. Radoslav Harman, PhD.

COURSE DESCRIPTION

Academic year: 2026/2027

University: Comenius University Bratislava

Faculty: Faculty of Mathematics, Physics and Informatics

Course ID:	**Course title:**
FMFI.KAI/1-AIN-430/22	Programming Paradigms

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

Type, volume, methods and workload of the student - additional information
2 hrs. lessons, 2 hrs. excerses

Number of credits: 6

Recommended semester: 5.

Educational level: I.

Prerequisites:

Antirequisites: FMFI.KAI/1-AIN-430/00

Course requirements:
Grades: A 90%, B 80%, C 70%, D 60%, E 50%.
Scale of assessment (preliminary/final): regular exercises, midterm 70/30 midterm, exam, homeworks (12x3), midterm (25), exam (30)

Learning outcomes:
Introduction to three programming paradigms: Concurrent programming, Functional Programming, Logic Programming

Class syllabus:
- Brief history of programming languages
- Introduction to programming paradigms
- Concurrent programming in GO
- Functional programming in Haskell
- Logic programming in Prolog
- Constraint logic programing CLP

Recommended literature:
Programming language pragmatics / Michael L. Scott. Amsterdam ; Boston : Elsevier/Morgan Kaufmann Pub.,, 2009
Programming in Haskell / Graham Hutton. Cambridge : Cambridge University Press, 2008
Pearls of functional algorithm design / Richard Bird. Cambridge : Cambridge University Press, 2010
The art of Prolog : Advanced programming techniques / Leon Sterling, Ehud Shapiro ; with a foreword by David H. D. Warren. Cambridge, Mass. : MIT Press, 1994
Haskell the craft of functional programming / Simon Thompson. Harlow : Pearson, 1999

Real world Haskell / Bryan O'Sullivan, John Goerzen, Don Stewart. Sebastopol : O'Reilly Media, Inc., 2009

Languages necessary to complete the course:
Slovak

Notes:

Past grade distribution
Total number of evaluated students: 144

A	B	C	D	E	FX
39,58	4,86	9,03	17,36	25,0	4,17

Lecturers: RNDr. Peter Borovanský, PhD.

Last change: 27.06.2022

Approved by: doc. Mgr. Tomáš Vinař, PhD., prof. Mgr. Radoslav Harman, PhD.

COURSE DESCRIPTION

Academic year: 2026/2027

University: Comenius University Bratislava

Faculty: Faculty of Mathematics, Physics and Informatics

Course ID:	**Course title:**
FMFI.KAMŠ/1-PMA-751/13	Programming in R

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., I.II.

Prerequisites:

Course requirements:
Evaluation based on: two tests (test1 40%, test 2 60%, teaching period)
Approximate grade thresholds: A 90%, B 80%, C 70%, D 60%, E 50%
Scale of assessment (preliminary/final): 100/0

Learning outcomes:
Students will learn to work in the R environment, program simple functions and work with data frames.

Class syllabus:
Working with envoronment and R workspaces, basic operations.
Manipulating variables, vectors, matrices and data frames.
Conditional statements and flow control. Basic programming techniques, writing scripts and functions. Working with data files, elementary statistical operations. Using graphical procedures for data visualization. Basic optimization functions. Creating documents with R markdown.

Recommended literature:
Matloff N: The art of R programming : A tour of statistical software design, San Francisco, No Starch Press (2011); Filová L: Programovanie v jazyku R, study materials (2021)

Languages necessary to complete the course:
Slovak, English

Notes:

Past grade distribution
Total number of evaluated students: 294

A	B	C	D	E	FX
49,32	14,29	9,52	12,24	9,52	5,1

Lecturers: Mgr. Radoslav Hurtiš, PhD., doc. Mgr. Lenka Filová, PhD.

Last change: 24.06.2022

Approved by: doc. Mgr. Tomáš Vinař, PhD., prof. Mgr. Radoslav Harman, PhD.

COURSE DESCRIPTION

Academic year: 2026/2027

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., I.II., II.

Prerequisites:

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

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

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

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

Languages necessary to complete the course:

Notes:

Past grade distribution
Total number of evaluated students: 746

A	B	C	D	E	FX
57,77	16,62	11,13	4,16	1,74	8,58

Lecturers: Viktoria Mirsalova

Last change: 20.06.2022

Approved by: doc. Mgr. Tomáš Vinař, PhD., prof. Mgr. Radoslav Harman, PhD.

COURSE DESCRIPTION

Academic year: 2026/2027

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., I.II., II.

Prerequisites:

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

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

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

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

Languages necessary to complete the course:

Notes:

Past grade distribution
Total number of evaluated students: 435

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

Lecturers: Viktoria Mirsalova

Last change: 20.06.2022

Approved by: doc. Mgr. Tomáš Vinař, PhD., prof. Mgr. Radoslav Harman, PhD.

COURSE DESCRIPTION

Academic year: 2026/2027

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., I.II., II.

Prerequisites:

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

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

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

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

Languages necessary to complete the course:

Notes:

Past grade distribution
Total number of evaluated students: 215

A	B	C	D	E	FX
68,84	17,67	9,3	2,33	0,0	1,86

Lecturers: Viktoria Mirsalova

Last change: 20.06.2022

Approved by: doc. Mgr. Tomáš Vinař, PhD., prof. Mgr. Radoslav Harman, PhD.

COURSE DESCRIPTION

Academic year: 2026/2027

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., I.II., II.

Prerequisites:

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

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

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

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

Languages necessary to complete the course:

Notes:

Past grade distribution
Total number of evaluated students: 153

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

Lecturers: Viktoria Mirsalova

Last change: 20.06.2022

Approved by: doc. Mgr. Tomáš Vinař, PhD., prof. Mgr. Radoslav Harman, PhD.

COURSE DESCRIPTION

Academic year: 2026/2027

University: Comenius University Bratislava

Faculty: Faculty of Mathematics, Physics and Informatics

Course ID:	**Course title:**
FMFI.KAMŠ/1-PMA-760/00	Sampling Theory

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

Number of credits: 3

Recommended semester: 5.

Educational level: I.

Prerequisites: FMFI.KAMŠ/1-MAT-282/00 - Probability and Statistics (2) or FMFI.KAMŠ/1-DAV-201/20 - Fundamentals of Probability and Statistics

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

Learning outcomes:
The student will master basic sampling schemes used in sampling from a finite population. He will be able to find interval estimates for unknown population parameters.

Class syllabus:
Simple random sampling, sampling without and with replacement. Estimate of population mean and proportion. Stratified random sampling. Stratification with proportional allocation. Optimum allocation, Neyman allocation. Systematic sampling. Elements of probabilistic random sampling. Inclusion probabilities, Horwitz-Thompson estimate and its properties. Bernoulli sampling, Poisson sampling.

Recommended literature:
Kalas, J.: Vybrané kapitoly z teórie náhodného výberu, skriptá MFF UK Bratislava 1996.
Cochran, W.G. Sampling techniques, Wiley and Sons, New York,1977.
Särndal, C. E., Swensson, B., Wretman, J.: Model Assisted Survey Sampling, Springer 1992.

Languages necessary to complete the course:

Notes:

Past grade distribution
Total number of evaluated students: 150

A	B	C	D	E	FX
28,0	17,33	20,67	14,67	11,33	8,0

Lecturers: doc. RNDr. Katarína Janková, CSc.

Last change: 26.11.2021
Approved by: doc. Mgr. Tomáš Vinař, PhD., prof. Mgr. Radoslav Harman, PhD.

COURSE DESCRIPTION

Academic year: 2026/2027

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., I.II., 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. Mgr. Tomáš Vinař, PhD., prof. Mgr. Radoslav Harman, PhD.

COURSE DESCRIPTION

Academic year: 2026/2027

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., I.II., II., III.

Prerequisites:

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

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

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

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

Languages necessary to complete the course:

Notes:

Past grade distribution
Total number of evaluated students: 155

A	ABS	B	C	D	E	FX	NEABS
40,65	21,29	7,1	4,52	0,65	1,29	21,29	3,23

Lecturers: Mgr. Aneta Barnes

Last change: 21.06.2022

Approved by: doc. Mgr. Tomáš Vinař, PhD., prof. Mgr. Radoslav Harman, PhD.

COURSE DESCRIPTION

Academic year: 2026/2027

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., I.II., II., III.

Prerequisites:

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

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

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

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

Languages necessary to complete the course:

Notes:

Past grade distribution
Total number of evaluated students: 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. Mgr. Tomáš Vinař, PhD., prof. Mgr. Radoslav Harman, PhD.

COURSE DESCRIPTION

Academic year: 2026/2027

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., I.II., II., III.

Prerequisites:

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

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

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

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

Languages necessary to complete the course:

Notes:

Past grade distribution
Total number of evaluated students: 32

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

Lecturers: Mgr. Aneta Barnes

Last change: 21.06.2022

Approved by: doc. Mgr. Tomáš Vinař, PhD., prof. Mgr. Radoslav Harman, PhD.

COURSE DESCRIPTION

Academic year: 2026/2027

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., I.II., II., III.

Prerequisites:

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

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

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

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

Languages necessary to complete the course:

Notes:

Past grade distribution
Total number of evaluated students: 25

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

Lecturers: Mgr. Aneta Barnes

Last change: 21.06.2022

Approved by: doc. Mgr. Tomáš Vinař, PhD., prof. Mgr. Radoslav Harman, PhD.

COURSE DESCRIPTION

Academic year: 2026/2027

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., I.II.

Prerequisites:

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

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

Class syllabus:
The student can sign up for the outdoor sports courses offered by the department: skiing, snowboarding 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: 310

A	B	C	D	E	FX
99,03	0,32	0,32	0,0	0,0	0,32

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

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

COURSE DESCRIPTION

Academic year: 2026/2027

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., I.II.

Prerequisites:

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

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

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

Recommended literature:

Languages necessary to complete the course:
Slovak

Notes:
KTVŠ will provide sports equipment.

Past grade distribution
Total number of evaluated students: 298

A	B	C	D	E	FX
92,62	0,0	0,0	0,0	0,34	7,05

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

COURSE DESCRIPTION

Academic year: 2026/2027

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., I.II.

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: 58

A	B	C	D	E	FX
98,28	0,0	0,0	0,0	0,0	1,72

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

COURSE DESCRIPTION

Academic year: 2026/2027

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., I.II.

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: 41

A	B	C	D	E	FX
90,24	0,0	0,0	0,0	0,0	9,76

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

COURSE DESCRIPTION

Academic year: 2026/2027

University: Comenius University Bratislava

Faculty: Faculty of Mathematics, Physics and Informatics

Course ID:	**Course title:**
FMFI.KAMŠ/1-DAV-303/20	Statistical 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: 6

Recommended semester: 5.

Educational level: I.

Prerequisites:

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

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

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.
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:
Casella G, Berger R: Statistical inference. 2nd ed. Cengane Learning 2001;
Anděl J: Základy matematické statistiky. Matfyzpress 2005.
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: 111

A	B	C	D	E	FX
31,53	21,62	26,13	7,21	0,9	12,61

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

Last change: 25.06.2022

Approved by: doc. Mgr. Tomáš Vinař, PhD., prof. Mgr. Radoslav Harman, PhD.

COURSE DESCRIPTION

Academic year: 2026/2027

University: Comenius University Bratislava

Faculty: Faculty of Mathematics, Physics and Informatics

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

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

Number of credits: 2

Recommended semester: 5.

Educational level: I., II.

Prerequisites:

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

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

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

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

Languages necessary to complete the course:
Slovak, English

Notes:

Past grade distribution
Total number of evaluated students: 237

A	B	C	D	E	FX
69,62	16,88	6,75	3,38	1,27	2,11

Lecturers: prof. Mgr. Radoslav Harman, PhD.

Last change: 10.03.2022

Approved by: doc. Mgr. Tomáš Vinař, PhD., prof. Mgr. Radoslav Harman, PhD.

COURSE DESCRIPTION

Academic year: 2026/2027

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., I.II.

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: 72

A	B	C	D	E	FX
52,78	19,44	6,94	4,17	4,17	12,5

Lecturers: Mgr. Ing. Jana Kočvarová

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

COURSE DESCRIPTION

Academic year: 2026/2027

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., I.II.

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. Mgr. Tomáš Vinař, PhD., prof. Mgr. Radoslav Harman, PhD.

COURSE DESCRIPTION

Academic year: 2026/2027

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: 468

A	B	C	D	E	FX
19,87	15,38	16,45	19,66	21,15	7,48

Lecturers: doc. RNDr. Mária Trnovská, PhD.

Last change: 16.06.2022

Approved by: doc. Mgr. Tomáš Vinař, PhD., prof. Mgr. Radoslav Harman, PhD.

COURSE DESCRIPTION

Academic year: 2026/2027

University: Comenius University Bratislava

Faculty: Faculty of Mathematics, Physics and Informatics

Course ID:	**Course title:**
FMFI.KI/2-INF-176/15	Unix for System Administrators

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: 6

Recommended semester: 3.

Educational level: I., II.

Prerequisites:

Course requirements:
Practical assignments (both during the semester and on final exam)
Approximate grading scale: A 92%, B 84%, C 76%, D 68%, E 60%
Scale of assessment (preliminary/final): 40/60

Learning outcomes:
After completing the course the students will know the principles of UNIX system administration and they will be able to practically carry out the basic duties of a system administrator.

Class syllabus:
users, groups, passwords
access permissions for files and directories, ACL
filesystem structure
character and block devices
special filesystem objects (symlink, pipe)
mounting and unmounting of filesystems to the directory hierarchy (mount, umount, /etc/fstab)
creating filesystems
system startup and shutdown - /etc/inittab, runlevels
job scheduling (cron, at, batch)
TCP/IP configuration (ifconfig, route)
network services (/etc/services, /etc/inetd.conf, /etc/protocols, /etc/hosts, ...)
DNS – client (/etc/resolv.conf)
DNS – server
NFS
Firewall
SystemD
Assumptions:
good user-level knowledge of UNIX systems, directory hierarchy navigation, creating and editing files (vi, joe), shell programming (sh/bash), commands find, grep, cat, cut, ls, awk.

Recommended literature:

Course notes provided on the course website, freely available electronic materials

Languages necessary to complete the course:
Slovak, English

Notes:

Past grade distribution
Total number of evaluated students: 311

A	B	C	D	E	FX
16,4	29,58	26,05	13,83	9,65	4,5

Lecturers: RNDr. Jaroslav Janáček, PhD., Ing. Dušan Bernát, PhD., doc. Mgr. Tomáš Plachetka, Dr.

Last change: 22.06.2022

Approved by: doc. Mgr. Tomáš Vinař, PhD., prof. Mgr. Radoslav Harman, PhD.

COURSE DESCRIPTION

Academic year: 2026/2027

University: Comenius University Bratislava

Faculty: Faculty of Mathematics, Physics and Informatics

Course ID:	**Course title:**
FMFI.KAG/1-DAV-211/20	Visual Data in Cultural Heritage

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:

Course requirements:
Continuous assessment: homework, 40%
Exam: midterm and final tests
Exam weight: 60%
Grading: A (100-91), B (90-81), C (80-71), D (70-61), E (60-51), Fx (50-0).
Scale of assessment (preliminary/final): Weight of interim / final evaluation: Interim evaluation 40% / final 60%.

Learning outcomes:
The course offers knowledge in the dynamically developing field of processing and presentation of large visual data of cultural heritage. Graduates will get acquainted with contactless scanning (Cruse), rules and methods of effective authoring and state-of-the-art technologies according to the recommendations of the ACM Computing Curriculum.

Class syllabus:
Basic definitions. Historical overview, concept of Visual Data Science. Metaphors of memory, data, metadata and paradata, international standard CIDOC CRM. Information and metadata visualization. International standardization, copyright, FAIR data.
Documentation. Original, copy, aura, genius loci (Benjamin, Norberg-Schulz, World Cultural Heritage), digital heritage theory (Cameron-Kenderdine). Image processing, digital and computational photography, best views, measuring image quality, e.g. copies of the object and the virtual museum (engagement factor). Bezděk 's methodology of photo documentation of Czech archives. Digitization of Slovak museums and galleries. CRUSE scanner and standard scanning modes. Scanning rare clean papers for experiments in the authoring tool Rebelle (Escape Motions). Point clouds, plane and space triangulation, levels of detail, capturing of reliefs and 3D objects.
Presentation of digital cultural heritage, PREMO standard, comparison of Europeana, Comeniana, Making Sense of Illustrated Handwritten Archives and Movio projects. Creation of a virtual museum. Europeana data model (EDM), encoding of image and multimedia data (TIFF, HDRI, MPEG-4, MPEG-7, MPEG-21, BigTable). Selected presentation methods (panoramas, tone mapping, Google Street View, Multi-view Stereo for Community Photo Collections, Digital Libraries, MOOC).

Recommended literature:

Computer graphics and image processing (in Slovak)/ Eugen Ružický, Andrej Ferko. Bratislava : Sapientia, 1995
BOHUMELOVÁ, M. ed. 2015. Rituál múzea v digitálnom veku. [online] https://issuu.com/sng.sk/docs/ritualmuzea_online/47
CAMERON, F. – KENDERDINE, S. eds. 2007. Theorizing Digital Cultural Heritage. ISBN 0-262-03353-4. Cambridge: MIT Press 2007
CROFTS, N. et al. eds. 2005. Definition of the CIDOC Conceptual Reference Model. http://cidoc.ics.forth.gr/official_release _cidoc.html
NATALE, M. T. et al. 2012. Handbook on virtual exhibitions and virtual performances. Roma: Officine grafische tiburtine.
Class materials available from class web page at http://www.sccg.sk/~ferko/Vdak.htm.

Languages necessary to complete the course:
English, Slovak

Notes:
The class is taught eventually in a distant mode, as well.

Past grade distribution
Total number of evaluated students: 53

A	B	C	D	E	FX
81,13	11,32	1,89	0,0	0,0	5,66

Lecturers: doc. RNDr. Andrej Ferko, PhD., RNDr. Zuzana Berger Haladová, PhD.

Last change: 22.06.2022

Approved by: doc. Mgr. Tomáš Vinař, PhD., prof. Mgr. Radoslav Harman, PhD.

COURSE DESCRIPTION

Academic year: 2026/2027

University: Comenius University Bratislava

Faculty: Faculty of Mathematics, Physics and Informatics

Course ID:	**Course title:**
FMFI.KDMFI/1-AIN-189/22	Web Applications (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: 6

Recommended semester: 2.

Educational level: I.

Prerequisites:

Recommended prerequisites:
1-AIN-112 Introduction to web technologies

Antirequisites: FMFI.KZVI/1-AIN-615/00

Course requirements:
Intermediate assessment: practical assignments, project (max 20%)
Exam: practical (at least 70% of the semester points are needed)
Indicative evaluation scale: A 90%, B 80%, C 70%, D 60%, E 50%
Scale of assessment (preliminary/final): 20/80

Learning outcomes:
After completing the course, students will be able to create a simple server-side web application with personalized access to individual parts of the application. The data will be stored in a database.

Class syllabus:
- Server-side web applications
- Introduction to PHP
- Basic language structures (1)
- Variables, constants, strings, operators, conditions, loops
- Basic language structures (2)
- working with date and time, arrays, functions to work with arrays and strings
- Reusing code
- Form processing, input processing and treatment
- SESSION, COOKIES
- Introduction to working with a database
- Basic database queries
- SELECT, INSERT, UPDATE, DELETE
- Linking PHP to the database
- Working with multiple tables at the same time

Recommended literature:
actual documentation for each technology
w3schools.com
own electronic texts published on the website or in the Moodle environment

Languages necessary to complete the course:
Slovak, English

Notes:

Past grade distribution
Total number of evaluated students: 1081

A	B	C	D	E	FX
40,24	12,4	10,18	10,64	9,81	16,74

Lecturers: PaedDr. Roman Hrušecký, PhD., RNDr. Marek Nagy, PhD., prof. RNDr. Zuzana Kubincová, PhD.

Last change: 21.06.2022

Approved by: doc. Mgr. Tomáš Vinař, PhD., prof. Mgr. Radoslav Harman, PhD.