Course descriptions

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COURSE DESCRIPTION

Academic year: 2025/2026

University: Comenius University Bratislava

Faculty: Faculty of Mathematics, Physics and Informatics

Course ID:	**Course title:**
FMFI.KAG/1-FYZ-115/13	Algebra and Geometry (1)

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: 5

Recommended semester: 1.

Educational level: I.

Prerequisites:

Course requirements:
Continuous assessment: test
Examination: written and oral examination
Indicative assessment scale: A 90%, B 80%, C 70%, D 60%, E 50%
Scale of assessment (preliminary/final): 20/80

Learning outcomes:
After completing the course the student will master the basic concepts and methods of linear algebra will be able to use them in geometry and physics.

Class syllabus:
Sets and representations, fields and vector spaces, basics of matrix calculus, systems of linear equations, linear subspaces and linear independence, basis and dimension, linear representations, matrix of linear representation, inverse matrices and transition matrices, base change, affine subspaces, determinants.

Recommended literature:
Linear Algebra and Geometry: A Journey of Three Dimensions with Overlaps in Related Fields / Pavol Zlatoš. Bratislava: Albert Marenčin, 2011; electronic version available at http://thales.doa.fmph.uniba.sk/zlatos/la/LAG_A4.pdf
We grow linear algebra / Luboš Motl, Miloš Zahradník. Prague: Karolinum, 2002
Lectures on Linear Algebra and Geometry / Július Korbaš, Štefan Gyurki. UK Publishing House, Bratislava, 2013

Languages necessary to complete the course:
Slovak, English

Notes:

Past grade distribution Total number of evaluated students: 528					
A	B	C	D	E	FX
13,64	18,56	18,75	16,86	22,16	10,04
Lecturers: prof. RNDr. Pavol Zlatoš, PhD., Mgr. Nina Hronkovičová, Mgr. Marián Poturnay					
Last change: 18.05.2022					
Approved by: doc. RNDr. Ivan Sýkora, PhD.					

COURSE DESCRIPTION

Academic year: 2025/2026

University: Comenius University Bratislava

Faculty: Faculty of Mathematics, Physics and Informatics

Course ID:	**Course title:**
FMFI.KAFZM/1-OZE-344/22	Analytical Methods of Environmental Physics (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: 5.

Educational level: I., I.II.

Prerequisites:

Course requirements:
Preliminary evaluation:
Final exam: oral / written
Indicative evaluation scale: A 90%, B 80%, C 70%, D 60%, E 50%
Scale of assessment (preliminary/final): 10/90

Learning outcomes:
The student will gain knowledge of analytical methods used in environmental physics to analyze gases, liquids and solids, specifically to determine the composition and quality of air and water. The course will also include a demonstration of equipment in laboratories and analysis of selected samples.

Class syllabus:
Introduction to spectroscopy and chromatography.
Infrared absorption and Raman scattering spectroscopy. Ultraviolet absorption spectroscopy and colorimetry. Fluorescence spectroscopy. Chemiluminescence. Electrochemical methods. Gas chromatography.
Theory of rotational, vibrational and electron spectra. Composition of spectrometers - radiation sources, monochromators, interferometers and detectors. Sample preparation and analysis by transmission and reflection techniques. Spectrum manipulation, adjustment and interpretation.
Classification of chromatographic methods. Chromatograph composition. Separation principles. Columns and detectors. Quantification.
Monitoring of pollutants in gaseous and aqueous media and sampling. Demonstration of some equipment, techniques and analysis of selected samples.

Recommended literature:
S.K. Dogra: Molecular spectroscopy, Tata McGraw Hill (2012)
B. C. Smith: Fundamentals of FTIR, CRC Press (1996)
J. R. Lakowicz: Principles of fluorescence spectroscopy, Springer (2006)
H. M. NcNair and J. M. Miller: Basic gas chromatography, Wiley (2009)

Languages necessary to complete the course:

Slovak in combination with English (some of the suggested readings are in English).

Notes:

Past grade distribution
Total number of evaluated students: 4

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

Lecturers: doc. RNDr. Karol Hensel, PhD.

Last change: 15.03.2022

Approved by: doc. RNDr. Ivan Sýkora, PhD.

COURSE DESCRIPTION

Academic year: 2025/2026	
University: Comenius University Bratislava	
Faculty: Faculty of Mathematics, Physics and Informatics	
Course ID: FMFI.KJFB+KAFZM/1-OZE-345/22	**Course title:** Analytical Methods of Environmental Physics (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: 3	
Recommended semester: 6.	
Educational level: I.	
Prerequisites:	
Course requirements: Interim evaluation: homework / essay Exam: Indicative assessment scale: A 90%, B 80%, C 70%, D 60%, E 50% Scale of assessment (preliminary/final): 80/20	
Learning outcomes: Students will gain knowledge about the use of accelerated ion beams for sample analysis. Students will get acquainted with the basic methods of atmospheric analysis.	
Class syllabus: Get acquainted with the system for ion production, acceleration and separation. Students will use accelerated ions for elemental analysis of samples using PIXE (particle induced X-ray emission), PIGE (particle induced gamma-ray emission) and RBS (Rutherford Backscattering Spectrometry) methods. They will get acquainted with the methods used for analysis of the atmosphere, which is characterized by meteorological elements. Measurement and analysis of air temperature and humidity, wind speed and direction, atmospheric pressure, precipitation, cloud cover, solar radiation and visibility.	
Recommended literature: Y. Wang a M. Nastasi: Handbook of Modern Ion Beam Materials Analysis, 2nd Edition, Materials Research Society (2009) General and regional climatology / Milan Lapin, Ján Tomlain. Bratislava : Univerzita Komenského, 2001 Guide to Instruments and Methods of Observation, Volume I –Measurement of Meteorological Variables, WMO-No.8	
Languages necessary to complete the course: Slovak in combination with English (literature in Enhlish)	
Notes:	

Past grade distribution
Total number of evaluated students: 1

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

Lecturers: doc. RNDr. Miroslav Ješkovský, PhD., RNDr. Juraj Bartok, PhD.

Last change: 09.03.2022

Approved by: doc. RNDr. Ivan Sýkora, PhD.

COURSE DESCRIPTION

Academic year: 2025/2026

University: Comenius University Bratislava

Faculty: Faculty of Mathematics, Physics and Informatics

Course ID:	**Course title:**
FMFI.KAFZM/2-FAA-152/14	Astrobiology

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

Number of credits: 3

Recommended semester: 2.

Educational level: I., II.

Prerequisites:

Course requirements:
Continuous Assessment : project and presentation (50%), assignments/tests after chapters/blocks (40%), activitiy/participation during the lectures (10%).
Approximate scale of final grades: A = at least 90%, B = at least 80%, C = at least 70%, D = at least 60%, E = at least 50%, Fx = below 50%
Scale of assessment (preliminary/final): 100/0

Learning outcomes:
The aim of this course is to provide students with up-to-date knowledge of astronomical and biological aspects of the origin of life including conditions required to harbor life on our home planet and elsewhere in the universe.

Class syllabus:
Astrobiology as a research field - introduction. Stars, planets, exoplanets. Conditions on early Earth. Comets and asteroids – sources of organic compounds. Habitable zone and terrestrial planets (HZ definition, search for life on Mars). Other life-supporting regions in the Solar system. Conditions for emergence of life on early Earth – biogenic elements and their origin in nucleosynthesis, water – mandatory but not sufficient condition for life as we know it, evidence of the first life forms, alternatives to water-carbon based life. Abiogenesis – RNA, LUCA and central dogma of molecular biology. Evolution and domains of life. Impacts and global cataclysms, major extinctions. Influence of the Moon on the stability of the biosphere. Physical and chemical limits of the biosphere - extremophiles. Biosignatures and their observation in space. Emergence of complex and intelligent life. Drake’s equation and it’s relevance for astrobiology. Fermi’s paradox. Extraterrestrial civilizations and impacts of their potential discovery.

Recommended literature:
COCKELL, CH. S.: Astrobiology – Understanding Life in the Universe (2nd edition), Hoboken: Wiley-Blackwell (2020).
DOMAGAL-GOLDMAN, S. D. – WRIGHT, K.E. et al.: The Astrobiology Primer v 2.0., Astrobiology, 16 (2016).

GARGAUD, M. – LÓPEZ-GARCIA, P. – HERVÉ, M.(eds.): Origins and Evolution of Life: An Astrobiological Perspective, Cambridge, UK: Cambridge University Press (2011).
ROTHERY, D. – GILMOUR, I. – SEPHTON, M.: An Introduction to Astrobiology, Cambridge, UK: Cambridge University Press (2018).

Languages necessary to complete the course:
Slovak / English

Notes:

Past grade distribution
Total number of evaluated students: 37

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

Lecturers: RNDr. Tomáš Paulech, PhD.

Last change: 16.05.2024

Approved by: doc. RNDr. Ivan Sýkora, PhD.

COURSE DESCRIPTION

Academic year: 2025/2026

University: Comenius University Bratislava

Faculty: Faculty of Mathematics, Physics and Informatics

Course ID:	**Course title:**
FMFI.KJFB/1-UFY-241/10	Atomic and Nuclear Physics

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: 5

Recommended semester: 4.

Educational level: I., I.II.

Prerequisites:

Course requirements:
Continuous assessment: presentation of homework results (3x10 marks)
Exam: written (40 marks), oral (30 marks)
Indicative assessment scale: A 90%, B 80%, C 70%, D 60%, E 50%
Credits will be awarded if the student obtains at least 50% points.

Learning outcomes:
Graduates have a basic knowledge of Atomic and Nuclear Physics at the level of a core university course in general physics. They know how to use the concepts and methods of atomic and nuclear physics in solving problem situations. They have an idea of the boundaries between high school and university physics in the field of nuclear and nuclear in terms of work with high school youth with an increased interest in physics.

Class syllabus:
Photoelectric effect, Compton effect, Rutherford experiment, Bohr model, timeless Schrödinger equation, structure of atoms and molecules, basic properties of nuclei, structure of nuclei, transformation of nuclei, nuclear reactions, nuclear power plant, particle accelerators.

Recommended literature:
Fyzika část 5. Moderní fyzika : Vysokoškolská učebnice obecné fyziky / David Halliday, Robert Resnick, Jearl Walker ; přeložili Bohumila Lencová ... [et al.]. Brno : Vysoké učení technické VUTIUM, 2000
Všeobecná fyzika : 4 : atómová fyzika / Ján Vanovič. Bratislava : Alfa, 1980
Physics : principles with applications / Douglas C. Giancoli. Upper Saddle River, N.J. : Pearson/ Prentice Hall, 2005
Own electronic texts of the subject published through the course website.

Languages necessary to complete the course:
Slovak and English.

Notes:

Past grade distribution Total number of evaluated students: 195					
A	B	C	D	E	FX
21,54	17,95	18,97	16,92	21,54	3,08
Lecturers: doc. RNDr. Radoslav Böhm, PhD., Ing. Jakub Kaizer, PhD.					
Last change: 18.06.2022					
Approved by: doc. RNDr. Ivan Sýkora, PhD.					

COURSE DESCRIPTION

Academic year: 2025/2026

University: Comenius University Bratislava

Faculty: Faculty of Mathematics, Physics and Informatics

Course ID:	**Course title:**
FMFI.KJFB+KAFZM/1-OZE-910/22	BSc Thesis

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: 6.

Educational level: I.

Prerequisites:

Course requirements:

Learning outcomes:

Class syllabus:

Recommended literature:

Languages necessary to complete the course:

Notes:

Past grade distribution
Total number of evaluated students: 35

A	B	C	D	E	FX
91,43	2,86	2,86	2,86	0,0	0,0

Lecturers:

Last change: 21.12.2021

Approved by: doc. RNDr. Ivan Sýkora, PhD.

STATE EXAM DESCRIPTION

Academic year: 2025/2026	
University: Comenius University Bratislava	
Faculty: Faculty of Mathematics, Physics and Informatics	
Course ID: FMFI.KJFB/1-OZE-991/22	**Course title:** BSc Thesis Defense
Number of credits: 8	
Recommended semester: 5., 6..	
Educational level: I.	
State exam syllabus:	
Last change: 21.12.2021	
Approved by: doc. RNDr. Ivan Sýkora, PhD.	

COURSE DESCRIPTION

Academic year: 2025/2026

University: Comenius University Bratislava

Faculty: Faculty of Mathematics, Physics and Informatics

Course ID:	**Course title:**
FMFI.KEF/2-FOL-116/15	Basic Electronics

Educational activities:
Type of activities: lecture / laboratory 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., II.

Prerequisites:

Course requirements:
Continuous assessment: work on practical exercises (100%). The condition for granting credits is the presentation of a semester project.
Indicative assessment scale: A 90%, B 80%, C 70%, D 60%, E 50%
Scale of assessment (preliminary/final): 100/0

Learning outcomes:
The student will understand the principles of using basic building blocks (resistor, inductance, capacitance, diode, transistor) in digital and analog circuits. They will understand the principles and use of basic digital and analog circuits (gates, counters, timers, operational amplifier, A / D and D / A converters, Arduino microprocessor system), principles of generating harmonic and non-harmonic signals and linear and pulse power supplies. They will be able to analyze basic circuits and use them to design simple electronic circuits with the required functionality. He will also gain practical experience with the construction and revitalization of simple electronic circuits.

Class syllabus:
Semiconductor diode and transistor and their basic connections. Transistor in switching mode, TTL digital circuits and their use. Basic logic circuits. Comparator. Timer 555. D / A and A / D converters. Arduino microprocessor system. Nodal potential method. Analysis of linear circuits in time and frequency domain. Linear model of transistor and operational amplifier. Basic circuits with operational amplifier. Positive feedback and oscillator principles. Power supplies and rectifiers.

Recommended literature:
The art of electronics / Paul Horowitz, Winfield Hill. New York : Cambridge University Press, 1989

Languages necessary to complete the course:
English

Notes:

Past grade distribution
Total number of evaluated students: 132

A	B	C	D	E	FX
96,21	0,0	3,03	0,0	0,0	0,76

Lecturers: doc. RNDr. František Kundracik, CSc., doc. RNDr. Matej Klas, PhD., doc. RNDr. Juraj Országh, PhD.

Last change: 27.06.2022

Approved by: doc. RNDr. Ivan Sýkora, PhD.

COURSE DESCRIPTION

Academic year: 2025/2026

University: Comenius University Bratislava

Faculty: Faculty of Mathematics, Physics and Informatics

Course ID:	**Course title:**
FMFI.KMANM+KJFB/1-BMF-110/15	Basics of Mathematics (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: 8

Recommended semester: 1.

Educational level: I.

Prerequisites:

Course requirements:
Preliminary evaluation: 3 written partial exams (100%)
Final exam: oral (45%) / written (55%)
Indicative evaluation scale: A 90%, B 80%, C 70%, D 65%, E 55%
Scale of assessment (preliminary/final): 40/60
Scale of assessment (preliminary/final): 40/60

Learning outcomes:
After completing the course, students will gain basic knowledge and skills of linear algebra and geometry and differential calculus for functions of one real variable.

Class syllabus:
Linear algebra and geometry (determinants, matrices, systems of linear equations, linear spaces, linear mappings, scalar and cross products, quadratic forms).
Differential calculus for functions of one real variable (limits and continuity, the derivative and differentiability, main theorems of the differential calculus and their consequences, Taylor's formula, graphing a function).

Recommended literature:
Matematika 1 : Pre štúdium technických vied / I. Kluvánek...[et al.]. Bratislava : SVTL, 1966
Matematika 1 : Príručka pre vysoké školy technické / Ján Ivan. Bratislava : Alfa, 1984
Lineárna algebra a geometria : Cesta z troch rozmerov s presahmi do príbuzných odborov / Pavol Zlatoš. Bratislava : Albert Marenčin, 2011
Zbierka úloh z vyššej matematiky : 1. časť / Jozef Eliaš, Ján Horváth, Juraj Kajan. Bratislava : Alfa, 1971
Zbierka úloh z vyššej matematiky : 2. časť / Jozef Eliaš, Ján Horváth, Juraj Kajan. Bratislava : Slovenské vydavateľstvo technickej literatúry, 1966
Zbierka úloh z vyššej matematiky : 3. časť / Jozef Eliaš, Ján Horváth, Juraj Kajan. Bratislava : Slovenské vydavateľstvo technickej literatúry, 1967

Languages necessary to complete the course:

Notes:

Past grade distribution
Total number of evaluated students: 208

A	B	C	D	E	FX
7,69	9,62	14,9	14,42	21,15	32,21

Lecturers: doc. RNDr. Eugen Viszus, CSc., doc. RNDr. Radoslav Böhm, PhD.

Last change: 16.06.2022

Approved by: doc. RNDr. Ivan Sýkora, PhD.

COURSE DESCRIPTION

Academic year: 2025/2026

University: Comenius University Bratislava

Faculty: Faculty of Mathematics, Physics and Informatics

Course ID:	**Course title:**
FMFI.KMANM+KJFB/1-BMF-150/15	Basics of Mathematics (2)

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: 8

Recommended semester: 2.

Educational level: I.

Prerequisites: FMFI.KMANM+KJFB/1-BMF-110/15 - Basics of Mathematics (1)

Recommended prerequisites:
1-BMF-110 Basics of mathematics (1)

Course requirements:
Preliminary evaluation: 3 written partial exams (100%)
Final exam: oral (45%) / written (55%)
Indicative evaluation scale: A 90%, B 80%, C 70%, D 65%, E 55%
Scale of assessment (preliminary/final): 40/60

Learning outcomes:
After completing the course, students will gain basic knowledge and skills of differential calculus for functions of several variables, integral calculus for functions of one variable, convergence of series and elementary methods of solving ordinary differential equations.

Class syllabus:
Differential calculus for vector-valued functions of one real variable, differential calculus for functions of several real variables (limits and continuity, partial derivative and differentiability, Taylor's formula, extremal points, implicit functions, constrained critical points). Integral calculus for functions of one real variable (indefinite integral, Riemann's definite integral, improper integral). Series, elementary methods of solving ordinary differential equations.

Recommended literature:
Matematika pre štúdium technických vied : 1. diel / Igor Kluvánek, Ladislav Mišík, Marko Švec. Bratislava : Slovenské vydavateľstvo technickej literatúry, 1959
Matematika pre štúdium technických vied : 2 diel / I. Kluvánek...[et al.]. Bratislava : SVTL, 1965
Matematika 1 : Príručka pre vysoké školy technické / Ján Ivan. Bratislava : Alfa, 1984
Matematika 2 / Ján Ivan. Bratislava : Alfa, 1989
Zbierka úloh z vyššej matematiky : 2. časť / Jozef Eliaš, Ján Horváth, Juraj Kajan. Bratislava : Alfa, 1986
Zbierka úloh z vyššej matematiky : 3. časť / Jozef Eliaš, Ján Horváth, Juraj Kajan. Bratislava : Slovenské vydavateľstvo technickej literatúry, 1967

Zbierka úloh z vyššej matematiky : 4. časť / Jozef Eliaš ... [et al.]. Bratislava : Alfa, 1972

Languages necessary to complete the course:
Slovak, English

Notes:

Past grade distribution
Total number of evaluated students: 163

A	B	C	D	E	FX
6,75	7,98	19,02	18,4	25,77	22,09

Lecturers: doc. RNDr. Eugen Viszus, CSc., doc. RNDr. Radoslav Böhm, PhD.

Last change: 16.06.2022

Approved by: doc. RNDr. Ivan Sýkora, PhD.

COURSE DESCRIPTION

Academic year: 2025/2026

University: Comenius University Bratislava

Faculty: Faculty of Mathematics, Physics and Informatics

Course ID:	**Course title:**
FMFI.KMANM/1-BMF-226/15	Basics of Mathematics (3)

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: 4

Recommended semester: 3.

Educational level: I.

Prerequisites:

Course requirements:
Preliminary evaluation: tests/homeworks
Final exam: oral / written written exam
Indicative evaluation scale: A 90%, B 80%, C 70%, D 60%, E 50%
Scale of assessment (preliminary/final): 70/30

Learning outcomes:
Acquisition of knowledge. The student will be able to use integral calculus in N-dimensional Euclidean spaces, line integral as a tool for solving physical problems. He will also be acquainted with the use of power series methods.

Class syllabus:
1. Power series, Taylor series
2. Multidimensional integrals
3. Line integrals, potential vector fields

Recommended literature:
Demetrian, M., Integrály v R6N, integrály závislé od parametra, krivkové a plošné integrály, Univerzita Komenského : Bratislava, 2023
Matematika : diel 1 : pre štúdium technických vied / Igor Kluvánek, Ladislav Mišík, Marko Švec. Bratislava : Alfa, 1971
Matematika pre štúdium technických vied : 2. diel / Igor Kluvánek, Ladislav Mišík, Marko Švec. Bratislava : Alfa, 1970
Cvičenia z matematickej analýzy II / Zbyněk Kubáček, Ján Valášek. Bratislava : Univerzita Komenského, 1996
Matematická analýza IV / Mária Barnovská, Kristína Smítalová. Bratislava : Univerzita Komenského, 1984
Zbierka úloh z vyššej matematiky : 1. časť / Jozef Eliaš, Ján Horváth, Juraj Kajan. Bratislava : Alfa, 1968

Languages necessary to complete the course:

Notes:

Past grade distribution
Total number of evaluated students: 157

A	B	C	D	E	FX
10,19	12,74	12,74	21,66	24,84	17,83

Lecturers: doc. RNDr. Michal Demetrian, PhD., doc. RNDr. Eugen Viszus, CSc., RNDr. Michal Pospíšil, PhD.

Last change: 06.09.2024

Approved by: doc. RNDr. Ivan Sýkora, PhD.

COURSE DESCRIPTION

Academic year: 2025/2026

University: Comenius University Bratislava

Faculty: Faculty of Mathematics, Physics and Informatics

Course ID:	**Course title:**
FMFI.KMANM/1-BMF-261/22	Basics of Mathematics (4)

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: 5

Recommended semester: 4.

Educational level: I.

Prerequisites:

Course requirements:
Preliminary evaluation: test
Final exam: oral / written exam
Indicative evaluation scale: A 90%, B 80%, C 70%, D 60%, E 50%
Scale of assessment (preliminary/final): 70/30

Learning outcomes:
The student will gain experience in working with Fourier series and experience in the formulation and solution of problems regarding heat conduction (and diffusion)

Class syllabus:
1. Functional series
2. Orthogonal developments and Fourier series
3. Heat conduction and diffusion - mathematical methods

Recommended literature:
Fourierove rady a Fourierov integrál / Michal Demetrian. Bratislava : Univerzita Komenského, 2012
Matematika pre štúdium technických vied : 2. diel / Igor Kluvánek, Ladislav Mišík, Marko Švec. Bratislava : Alfa, 1970
Matematická fyzika : Základné rovnice a špeciálne funkcie / Vasilij Jakovlevič Arsenin ; preložil Jozef Kačur. Bratislava : Alfa, 1977
Zbierka úloh z vyššej matematiky : 1. časť / Jozef Eliaš, Ján Horváth, Juraj Kajan. Bratislava : Alfa, 1971

Languages necessary to complete the course:
Slovak, English

Notes:

Past grade distribution Total number of evaluated students: 141					
A	B	C	D	E	FX
14,18	17,73	16,31	17,02	24,11	10,64
Lecturers: doc. RNDr. Michal Demetrian, PhD., doc. RNDr. Eugen Viszus, CSc.					
Last change: 13.02.2024					
Approved by: doc. RNDr. Ivan Sýkora, PhD.					

COURSE DESCRIPTION

Academic year: 2025/2026

University: Comenius University Bratislava

Faculty: Faculty of Mathematics, Physics and Informatics

Course ID:	**Course title:**
FMFI.KJFB/1-OZE-610/15	Basics of Radiation Physics and Radiation Protection

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., I.II.

Prerequisites:

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

Learning outcomes:
Graduates of the course will have basic knowledge of radiation physics and principles of radiation protection, and will also gain a comprehensive view of the applications of ionizing radiation in practice. The lecture will also help students more easily accept the laws of the microworld, which are unimaginable for a classical physicist.

Class syllabus:
Sources of ionizing radiation: radionuclide sources, accelerators as sources of ionizing radiation. Quantities and units in radiation physics and protection: quantities characterizing radiation sources, radiation field and radiation action on matter, relationships between radiation quantities. Biological effects of ionizing radiation and their health effects. Environmental radioactivity: sources of radioactivity, distribution of radionuclides in nature, radiotoxicity. Applications of ionizing radiation: medical diagnostics and therapy, nuclear power, industrial irradiators, radioactive dating. Radioactive waste. Basic principles of radiation protection. Radiation protection of workers, residents and the environment. Dose limits. Monitoring in radiation physics and protection. Sources of ionizing radiation: radionuclide sources, nuclear reactors, accelerators as sources of ionizing radiation.
Wave properties of particles (description of particles in quantum mechanics – de Broglie waves and their superposition, wave packets, uncertainty principle). Equivalence of particle motion in a force field with the passage of light waves in an optical medium. Optics versus quantum mechanics, timeless SHR and its solution. Simple systems (potential walls, mounds, wells and their applications). Approximate method for solving SCHR.

Recommended literature:
O.Holá, K.Holý: Radiačná ochrana- Ionizujúce žiarenie, jeho účinky a ochrana pred ionizujúcim žiarením. STU, Bratislava,2010.

V.Klener: Principy a praxe radiační ochrany, SUJB, Praha, 2000

Languages necessary to complete the course:
Slovak, English

Notes:

Past grade distribution
Total number of evaluated students: 105

A	B	C	D	E	FX
60,0	11,43	12,38	8,57	6,67	0,95

Lecturers: RNDr. Terézia Eckertová, PhD., doc. RNDr. Radoslav Böhm, PhD., doc. RNDr. Monika Müllerová, PhD.

Last change: 08.07.2025

Approved by: doc. RNDr. Ivan Sýkora, PhD.

COURSE DESCRIPTION

Academic year: 2025/2026

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: 235					
A	B	C	D	E	FX
50,64	15,32	13,19	9,79	2,98	8,09
Lecturers: RNDr. Barbora Cimrová, PhD., doc. PhDr. Ján Rybár, PhD.					
Last change: 04.07.2022					
Approved by: doc. RNDr. Ivan Sýkora, PhD.					

COURSE DESCRIPTION

Academic year: 2025/2026

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: 94

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

Lecturers: doc. PhDr. Ján Rybár, PhD.

Last change: 17.05.2024

Approved by: doc. RNDr. Ivan Sýkora, PhD.

COURSE DESCRIPTION

Academic year: 2025/2026

University: Comenius University Bratislava

Faculty: Faculty of Mathematics, Physics and Informatics

Course ID:	**Course title:**
FMFI.KAFZM/1-BMF-181/15	Complementary Classes in Mechanics

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:
Preliminary evaluation: tests
Final exam: test
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 much more experienced with the formulation and mathematical expression of selected problems in mechanics.

Class syllabus:
Translational motion. Rotational motion. Newton's laws of dynamics, force, momentum. Gravitational field. Work, kinetic and potential energy, moment of force, angular momentum. Conservation laws in mechanics. Rigid body mechanics, center of gravity, moment of inertia, Steiner's theorem, rotational motion. Fluid mechanics. Oscillations - free, damped and driven, resonance.

Recommended literature:
Fyzika1 / David Halliday, Robert Resnick, Jearl Walker. Brno: VUTIUM, 2013
Fyzika v príkladoch / Vladimír Hajko. Bratislava : Slovenské vydavateľstvo technickej literatúry, 1967

Languages necessary to complete the course:
Slovak, English

Notes:

Past grade distribution
Total number of evaluated students: 93

A	B	C	D	E	FX
74,19	10,75	8,6	2,15	3,23	1,08

Lecturers: RNDr. Milan Zvarík, PhD.

Last change: 09.03.2022
Approved by: doc. RNDr. Ivan Sýkora, PhD.

COURSE DESCRIPTION

Academic year: 2025/2026

University: Comenius University Bratislava

Faculty: Faculty of Mathematics, Physics and Informatics

Course ID:	**Course title:**
FMFI.KEF/1-FYZ-232/22	Computational Physics

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: 4

Recommended semester: 4.

Educational level: I.

Prerequisites:

Course requirements:
Continuous assessment: elaboration of homework for individual lectures.
Indicative assessment scale: A 90%, B 80%, C 70%, D 60%, E 50%
Scale of assessment (preliminary/final): 100/0

Learning outcomes:
The graduate of the course will acquire the skills necessary for the numerical solution of simple physical problems and will learn the basic algorithms of numerical calculations and their programming in a programming language (C ++, Python, ...)..

Class syllabus:
Numerical stability of simple iteration schemes. Transition from a continuous problem to a discrete one. Numerical solution of the wave equation. Nonlinear iteration schemes. Numerical calculation of integrals. Random numbers. Differential equations: Runge-Kutta methods. Systems of differential equations. Simple physical models, firing method, time evolution of nonlinear physical models, Brownian motion. Simple integral equation, Optimization.

Recommended literature:
W. H. Press et al..: Numerical Recipes. Cambridge Univ. Press, 1992

Languages necessary to complete the course:
Slovak, English

Notes:

Past grade distribution
Total number of evaluated students: 262

A	B	C	D	E	FX
57,25	9,54	7,63	6,11	8,02	11,45

Lecturers: doc. RNDr. Peter Papp, PhD., doc. Mgr. Jozef Kristek, DrSc.

Last change: 17.05.2022

Approved by: doc. RNDr. Ivan Sýkora, PhD.

COURSE DESCRIPTION

Academic year: 2025/2026

University: Comenius University Bratislava

Faculty: Faculty of Mathematics, Physics and Informatics

Course ID:	**Course title:**
FMFI.KAFZM/1-OZE-273/10	Dynamics of Flowing Gases

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:

Learning outcomes:

Class syllabus:

Recommended literature:

Languages necessary to complete the course:

Notes:

Past grade distribution
Total number of evaluated students: 45

A	B	C	D	E	FX
75,56	15,56	8,89	0,0	0,0	0,0

Lecturers: doc. RNDr. Mário Janda, PhD.

Last change: 25.01.2022

Approved by: doc. RNDr. Ivan Sýkora, PhD.

COURSE DESCRIPTION

Academic year: 2025/2026

University: Comenius University Bratislava

Faculty: Faculty of Mathematics, Physics and Informatics

Course ID:	**Course title:**
FMFI.KEF/1-FYZ-217/22	Electromagnetism

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: 3.

Educational level: I., I.II.

Prerequisites:

Course requirements:
Continuous assessment: written work
Exam: oral + written
Indicative assessment scale: A 90%, B 80%, C 70%, D 60%, E 50%
Scale of assessment (preliminary/final): 50/50

Learning outcomes:
By completing the course, the student will understand the basic laws applicable to electric and magnetic fields and will be able to apply them in solving problems.

Class syllabus:
Electrostatics of charges in vacuum, in the presence of conductors and in dielectrics. Coulomb's law, Gauss's law, electric potential, calculation of electric fields. Electric current, Ohm's law, Kirchhoff's laws. Magnetism and electric currents. Biotov-Savart-Laplace law, Ampere's law, magnetic vector potential, magnetic field in magnetic material, calculation of magnetic fields. Electromagnetic induction, Lenz's rule, inductance and mutual inductance. Alternating electric currents, RLC circuits. Relativity of electric and magnetic field. Electromagnetic waves, Poynting vector.

Recommended literature:
A. Tirpák: Elektromagnetizmus. Iris (2011)
D. Halliday, R. Resnick, J. Walker: Fyzika 1-5, Akademické nakladatelství VUTIUM (2007)

Languages necessary to complete the course:
Slovak / English (study literature in Slovak or English)

Notes:

Past grade distribution
Total number of evaluated students: 93

A	B	C	D	E	FX
27,96	10,75	15,05	9,68	19,35	17,2

Lecturers: doc. RNDr. František Kundracik, CSc., Mgr. Róbert Astaloš, PhD., doc. RNDr. Radoslav Böhm, PhD.
Last change: 14.03.2022
Approved by: doc. RNDr. Ivan Sýkora, PhD.

COURSE DESCRIPTION

Academic year: 2025/2026

University: Comenius University Bratislava

Faculty: Faculty of Mathematics, Physics and Informatics

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

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

Number of credits: 2

Recommended semester: 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: 291

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

Lecturers: Mgr. Aneta Barnes

Last change: 11.04.2024
Approved by: doc. RNDr. Ivan Sýkora, PhD.

COURSE DESCRIPTION

Academic year: 2025/2026

University: Comenius University Bratislava

Faculty: Faculty of Mathematics, Physics and Informatics

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

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

Number of credits: 2

Recommended semester: 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. RNDr. Ivan Sýkora, PhD.

COURSE DESCRIPTION

Academic year: 2025/2026

University: Comenius University Bratislava

Faculty: Faculty of Mathematics, Physics and Informatics

Course ID:	**Course title:**
FMFI.KJP/1-MXX-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.
The textbook has not been published. It is at students' disposal in an electronic format.
Anglický jazyk pre študentov FMFI UK : Aplikovaná matematika / Alexandra Maďarová, Ľubomíra Kožehubová.
The textbook has not been published. It is at students' disposal in an electronic format.
Anglický jazyk pre študentov FMFI UK : Matematika / kolektív autorov KJP.
The textbook has not been published. It is at students' disposal in an electronic format.
Anglický jazyk pre študentov FMFI UK : Fyzika / Alena Zemanová.
The textbook has not been published. It is at students' disposal in an electronic format.
Anglický jazyk pre študentov FMFI UK : Informatika / Elena Klátiková.
The textbook has not been published. It is at students' disposal in an electronic format.

Languages necessary to complete the course:
Slovak, English

Notes:

Past grade distribution
Total number of evaluated students: 7132

A	B	C	D	E	FX
29,54	23,11	18,17	12,56	7,84	8,78

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

Last change: 20.06.2022

Approved by: doc. RNDr. Ivan Sýkora, PhD.

COURSE DESCRIPTION

Academic year: 2025/2026

University: Comenius University Bratislava

Faculty: Faculty of Mathematics, Physics and Informatics

Course ID:	**Course title:**
FMFI.KJP/1-MXX-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: PhDr. Alena Zemanová, Mgr. Ing. Jana Kočvarová, Mgr. Alexandra Maďarová, Mgr. Ľubomíra Kožehubová, Mgr. Eva Foltánová, Mgr. Aneta Barnes, Mgr. Simona Dobiašová, PhD.
Last change: 20.06.2022
Approved by: doc. RNDr. Ivan Sýkora, PhD.

COURSE DESCRIPTION

Academic year: 2025/2026

University: Comenius University Bratislava

Faculty: Faculty of Mathematics, Physics and Informatics

Course ID:	**Course title:**
FMFI.KJP/1-MXX-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.
The textbook has not been published. It is at students' disposal in an electronic format.
Anglický jazyk pre študentov FMFI UK : Aplikovaná matematika / Alexandra Maďarová, Ľubomíra Kožehubová.
The textbook has not been published. It is at students' disposal in an electronic format.
Anglický jazyk pre študentov FMFI UK : Matematika / kolektív autorov KJP.
The textbook has not been published. It is at students' disposal in an electronic format.
Anglický jazyk pre študentov FMFI UK : Fyzika / Alena Zemanová.
The textbook has not been published. It is at students' disposal in an electronic format.
Anglický jazyk pre študentov FMFI UK : Informatika / Elena Klátiková.
The textbook has not been published. It is at students' disposal in an electronic format.

Languages necessary to complete the course:

Slovak, English

Notes:

Past grade distribution
Total number of evaluated students: 1422

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

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

Last change: 20.06.2022

Approved by: doc. RNDr. Ivan Sýkora, PhD.

COURSE DESCRIPTION

Academic year: 2025/2026

University: Comenius University Bratislava

Faculty: Faculty of Mathematics, Physics and Informatics

Course ID:	**Course title:**
FMFI.KJP/1-MXX-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.
The textbook has not been published. It is at students' disposal in an electronic format.
Anglický jazyk pre študentov FMFI UK : Aplikovaná matematika / Alexandra Maďarová, Ľubomíra Kožehubová.
The textbook has not been published. It is at students' disposal in an electronic format.
Anglický jazyk pre študentov FMFI UK : Matematika / kolektív autorov KJP.
The textbook has not been published. It is at students' disposal in an electronic format.
Anglický jazyk pre študentov FMFI UK : Fyzika / Alena Zemanová.
The textbook has not been published. It is at students' disposal in an electronic format.
Anglický jazyk pre študentov FMFI UK : Informatika / Elena Klátiková.
The textbook has not been published. It is at students' disposal in an electronic format.

Languages necessary to complete the course:
Slovak, English

Notes:

Past grade distribution
Total number of evaluated students: 4292

A	B	C	D	E	FX
25,19	28,1	21,6	11,84	6,06	7,22

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

Last change: 17.06.2022

Approved by: doc. RNDr. Ivan Sýkora, PhD.

COURSE DESCRIPTION

Academic year: 2025/2026

University: Comenius University Bratislava

Faculty: Faculty of Mathematics, Physics and Informatics

Course ID:	**Course title:**
FMFI.KJFB/1-OZE-151/22	Experimental Data Processing

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

Number of credits: 3

Recommended semester: 2.

Educational level: I.

Prerequisites:

Antirequisites: FMFI.KJFB/1-OZE-151/15

Course requirements:
Exam: written and oral exam, successful completion of the written part is condition of the oral part.
Share in the overall rating: 80/20.
Indicative assessment 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 be able to master the basic theoretical principles and gain practical experience in evaluating data from physical experiments.

Class syllabus:
Sources of measurement uncertainties. Characteristics of statistical files (averages, dispersion, ...). Dispersion folding rule, correlation coefficient. Some statistical distributions and their occurrence in the measurement. Multiplication factors to determine the interval width of the standard deviation distribution. Spreading uncertainties. Evaluation of functional dependencies, Estimates, method of maximum likelihood, stratified sampling, Least squares method for straight line, and generally linear and nonlinear functions, weighting coefficients. Calibration by regression method, prediction bands, uncertainty of the quantity determined from the calibration curve, critical level, detection limit, Hypothesis testing, interpretation of experiments, null hypothesis, Poisson statistics - what is a signal?).

Recommended literature:
L. Kubáčková, Metódy spracovania experimentálnych údajov, Veda, Bratislava, 1990
R. Barlow, Statistics (A Guide to the Use of Statistical Methods in the Physical Sciences), John Wiley&Sons, Chichester, England, 1999 (Manchester physics series)
G. Covan, Statistical Data Analysis, Clarendon Press, Oxford, 1998 (Oxford Physics series)

Languages necessary to complete the course:
slovak, english

Notes:

Past grade distribution Total number of evaluated students: 8					
A	B	C	D	E	FX
0,0	0,0	37,5	37,5	25,0	0,0
Lecturers: doc. RNDr. Ivan Sýkora, PhD.					
Last change: 16.06.2022					
Approved by: doc. RNDr. Ivan Sýkora, PhD.					

COURSE DESCRIPTION

Academic year: 2025/2026

University: Comenius University Bratislava

Faculty: Faculty of Mathematics, Physics and Informatics

Course ID:	**Course title:**
FMFI.KJFB/1-FYZ-401/22	Fields of Physical Research

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

Number of credits: 2

Recommended semester: 4.

Educational level: I., I.II.

Prerequisites:

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

Learning outcomes:
The student will have an overview of modern research at FMFI UK, which will allow him to decide in which area of physics he wants to continue his master's degree, or to gain a broader view of physics.

Class syllabus:
Each week a lecture from one of the modern directions of research at the faculty.

Recommended literature:

Languages necessary to complete the course:
Slovak, English

Notes:

Past grade distribution
Total number of evaluated students: 256

A	B	C	D	E	FX
98,05	0,39	1,56	0,0	0,0	0,0

Lecturers: prof. RNDr. Jozef Masarik, DrSc.

Last change: 24.02.2022

Approved by: doc. RNDr. Ivan Sýkora, PhD.

COURSE DESCRIPTION

Academic year: 2025/2026

University: Comenius University Bratislava

Faculty: Faculty of Mathematics, Physics and Informatics

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

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

Number of credits: 2

Recommended semester: 1.

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

Prerequisites:

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

Learning outcomes:

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

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

Languages necessary to complete the course:

Notes:

Past grade distribution
Total number of evaluated students: 482

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

Lecturers: Mgr. Ľubomíra Kožehubová

Last change: 20.06.2022

Approved by: doc. RNDr. Ivan Sýkora, PhD.

COURSE DESCRIPTION

Academic year: 2025/2026

University: Comenius University Bratislava

Faculty: Faculty of Mathematics, Physics and Informatics

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

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

Number of credits: 2

Recommended semester: 2.

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. RNDr. Ivan Sýkora, PhD.

COURSE DESCRIPTION

Academic year: 2025/2026

University: Comenius University Bratislava

Faculty: Faculty of Mathematics, Physics and Informatics

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

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

Number of credits: 2

Recommended semester: 3.

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

Prerequisites:

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

Learning outcomes:

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

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

Languages necessary to complete the course:

Notes:

Past grade distribution
Total number of evaluated students: 120

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

Lecturers: Mgr. Ľubomíra Kožehubová

Last change: 20.06.2022

Approved by: doc. RNDr. Ivan Sýkora, PhD.

COURSE DESCRIPTION

Academic year: 2025/2026

University: Comenius University Bratislava

Faculty: Faculty of Mathematics, Physics and Informatics

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

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

Number of credits: 2

Recommended semester: 4.

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. RNDr. Ivan Sýkora, PhD.

COURSE DESCRIPTION

Academic year: 2025/2026

University: Comenius University Bratislava

Faculty: Faculty of Mathematics, Physics and Informatics

Course ID:	**Course title:**
FMFI.KAFZM/1-OZE-373/10	Fundamentals of Dynamic Meteorology

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:

Learning outcomes:
Students will acquire basic knowledge of atmospheric dynamics.

Class syllabus:
Equations of motion for the atmosphere. Forces in the atmosphere. Distribution of state quantities in the atmosphere. Vertical profiles of meteorological variables. simplified models of the atmosphere. Barometric formula. Vertical stability of the atmosphere, the effect of vertical movements on stability in the atmosphere. Particle and layer method. The energy of instability.

Recommended literature:

Languages necessary to complete the course:

Notes:

Past grade distribution
Total number of evaluated students: 12

A	B	C	D	E	FX
41,67	41,67	16,67	0,0	0,0	0,0

Lecturers: doc. RNDr. Martin Gera, PhD.

Last change: 19.08.2022

Approved by: doc. RNDr. Ivan Sýkora, PhD.

COURSE DESCRIPTION

Academic year: 2025/2026

University: Comenius University Bratislava

Faculty: Faculty of Mathematics, Physics and Informatics

Course ID:	**Course title:**
FMFI.KJFB/1-OZE-201/22	Fundamentals of Environmental Physics

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:
Exam: written and oral exam, successful completion of the written part is condition of the oral part.
Share in the overall rating: 80/20.
Indicative assessment scale: A 90%, B 80%, C 70%, D 60%, E 50%
Scale of assessment (preliminary/final): 0/100

Learning outcomes:
Students will gain basic information from environmental physics and their connection with knowledge from other physics

Class syllabus:
Mathematical foundations of environmental physics (Basics of statistical molecular physics and thermodynamics of ideal and real gas equations, Maxwell-Boltzman distribution and its consequences, heat, entropy). Thermal energy (Conversion of heat into work. Heat engines, maximum efficiency of heat engines, examples of heat engines – Carnot cycle, Otto cycle, Diesel engine, Stirling engine). Fission energy (Basic characteristics of nuclear reactions, reaction energy. Fission chain reaction of its phase and characteristics. Multiplication coefficient. Fission products. Reactor equation). Solar energy (Stefan-Boltzmann's law, Planck's law. Earth-Sun energy balance without the influence of greenhouse gases. Greenhouse model of energy balance). Wind energy (Fluid flow, maximum efficiency of wind turbines – Betz limit, energy transfer through fluids). Atmosphere and water on Earth, - Annual water balance on Earth, Latent heat, Temperature gradient, Temperature potential. Liquids - water potential, Gravitational potential, Osmotic potential, Liquid-air interconnection, Isotope representation in nature, - Isotopes in molecules, Natural occurrence of radioactive isotopes - origin of radionuclides, Stable isotopes - Fractional isotope representation, Isotope fractionation, Processes leading to fraction fractionation, Kinetic fractionation, Fraction temperature dependence, Fractionation rules, Isotopes as tracers - Tracer requirements, Types of tracers, Continental and altitude effect, Stable isotopes as paleoteplomer, - archives with paleo precipitation. Dating using radioactive isotopes, -14C, 3H, Tritium in oceanography ... Earth in the solar system, characteristics of the Sun, - Orbital variations of solar radiation, Attenuation of solar radiation in the atmosphere, Properties of real radiating objects, Natural greenhouse effect, Vertical structure , Radiation balance of the Earth - atmosphere system.

Recommended literature:

Principles of environmental physics / John Monteith, Mike Unsworth. Burlington : Academic press, 2008

Living in the Environment : An Introduction to Environmental Science / G. Tyler Miller, Jr.. Belmont : Wadsworth, 1992

Languages necessary to complete the course:

slovak, english

Notes:

Past grade distribution

Total number of evaluated students: 76

A	B	C	D	E	FX
40,79	17,11	10,53	18,42	13,16	0,0

Lecturers: doc. RNDr. Ivan Sýkora, PhD., doc. RNDr. Radoslav Böhm, PhD.

Last change: 19.02.2024

Approved by: doc. RNDr. Ivan Sýkora, PhD.

STATE EXAM DESCRIPTION

Academic year: 2025/2026	
University: Comenius University Bratislava	
Faculty: Faculty of Mathematics, Physics and Informatics	
Course ID: FMFI.KJFB/1-OZE-954/15	**Course title:** Fundamentals of Environmental Physics
Number of credits: 2	
Educational level: I.	
State exam syllabus:	
Last change: 15.02.2023	
Approved by: doc. RNDr. Ivan Sýkora, PhD.	

COURSE DESCRIPTION

Academic year: 2025/2026

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: 2.

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. RNDr. Ivan Sýkora, PhD.					

COURSE DESCRIPTION

Academic year: 2025/2026

University: Comenius University Bratislava

Faculty: Faculty of Mathematics, Physics and Informatics

Course ID:	**Course title:**
FMFI.KAFZM/1-OZE-302/22	Fundamentals of Physics of Water

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

Number of credits: 4

Recommended semester: 3.

Educational level: I.

Prerequisites:

Course requirements:

Learning outcomes:

Class syllabus:

Recommended literature:

Languages necessary to complete the course:

Notes:

Past grade distribution
Total number of evaluated students: 73

A	B	C	D	E	FX
26,03	21,92	20,55	16,44	13,7	1,37

Lecturers: prof. RNDr. Zdenko Machala, DrSc.

Last change: 25.01.2022

Approved by: doc. RNDr. Ivan Sýkora, PhD.

COURSE DESCRIPTION

Academic year: 2025/2026

University: Comenius University Bratislava

Faculty: Faculty of Mathematics, Physics and Informatics

Course ID:	**Course title:**
FMFI.KAFZM/1-OZE-301/10	Fundamentals of Physics of the Earth

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: 5.

Educational level: I.

Prerequisites:

Course requirements:

Learning outcomes:

Class syllabus:

Recommended literature:

Languages necessary to complete the course:

Notes:

Past grade distribution
Total number of evaluated students: 55

A	B	C	D	E	FX
40,0	29,09	16,36	1,82	7,27	5,45

Lecturers: doc. Mgr. Martin Gális, PhD., doc. RNDr. Sebastián Ševčík, CSc., RNDr. Róbert Kysel, PhD., RNDr. Adriena Ondrášková, PhD.

Last change: 25.01.2022

Approved by: doc. RNDr. Ivan Sýkora, PhD.

COURSE DESCRIPTION

Academic year: 2025/2026

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: 632

A	B	C	D	E	FX
19,3	11,23	15,03	21,52	22,63	10,28

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

Last change: 21.06.2022

Approved by: doc. RNDr. Ivan Sýkora, PhD.

COURSE DESCRIPTION

Academic year: 2025/2026

University: Comenius University Bratislava

Faculty: Faculty of Mathematics, Physics and Informatics

Course ID:	**Course title:**
FMFI.KEF/1-FYZ-212/15	Fundamentals of 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., I.II.

Prerequisites:

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

Learning outcomes:
The student will understand the principles of computer processing of numbers and the resulting limitations (data types, including links, number fields). They will understand the basic structures of the program (functions, branches, ...) and their use to algorithmize problem solving. They will be able to program in C / C ++ language simpler algorithms for solving mathematical and physical problems (eg movement in fields, calculation of fields, sums of rows, ...).

Class syllabus:
Basic structure of C / C ++ program, data types and their accuracy, program branching (if..else, switch, for, while, do..while), functions, use of references to return multiple values of functions, two- and multidimensional fields, texts , field references, data flows and their control (cin, cout), working with files (fstream), concept of object, drawing simple graphs from C ++ program (xmgrace, GNUplot), Euler's method for solving differential equations and its use for solving motion problems , roots of functions, numerical integration and its use for solving physical problems, random numbers and Monte Carlo methods, basics of object-oriented programming.

Recommended literature:
Kundracik, F .: Basics of Programming Practically. Vydavateľstvo UK 2013. On-line: http:// www.fmph.uniba.sk/index.php?id=3246
Materials on the course page: http://davinci.fmph.uniba.sk/~kundracik1/ZakladyProgramovania/

Languages necessary to complete the course:
Slovak, English

Notes:

Past grade distribution Total number of evaluated students: 368					
A	B	C	D	E	FX
58,7	6,79	10,6	8,7	8,97	6,25
Lecturers: doc. RNDr. František Kundracik, CSc., doc. RNDr. Peter Papp, PhD.					
Last change: 24.06.2022					
Approved by: doc. RNDr. Ivan Sýkora, PhD.					

COURSE DESCRIPTION

Academic year: 2025/2026

University: Comenius University Bratislava

Faculty: Faculty of Mathematics, Physics and Informatics

Course ID:	**Course title:**
FMFI.KAFZM/1-OZE-142/22	Fundametals of the Environment

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

Number of credits: 3

Recommended semester: 1.

Educational level: I.

Prerequisites:

Course requirements:
Preliminary evaluation: -
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:
By completing the course, the student will gain basic knowledge about the physics of the environment, specifically about the basic principles that create the current environment.

Class syllabus:
Origin and evolution of the universe. Origin and evolution of the solar system and the Earth. Origin and evolution of the earth's surface (continental drift and other processes causing a formation of the current earth's surface). Physical fields acting on the Earth. Origin and evolution of the atmosphere. Origin and evolution of the hydrosphere. Origin of life on Earth. Global environmental issues: ozone hole, global warming, acid rain. Environmental cycles: nitrogen oxides and nitrogen cycle; sulphur oxides and the sulphur cycle; carbon oxides and the carbon cycle.

Recommended literature:
M. Hvožďara: Naša Zem: Pevná i premenlivá, Veda (2012);
P. Smithson et al.: Fundamentals of the Physical Environment, Routledge (2008);
R. A. Bailey et al.: Chemistry of the Environment, Academic Press (2002).

Languages necessary to complete the course:

Notes:

Past grade distribution
Total number of evaluated students: 184

A	B	C	D	E	FX
86,96	10,87	2,17	0,0	0,0	0,0

Lecturers: doc. RNDr. Marcela Morvová, PhD., Mgr. Richard Cimerman, PhD.

Last change: 14.03.2022
Approved by: doc. RNDr. Ivan Sýkora, PhD.

COURSE DESCRIPTION

Academic year: 2025/2026

University: Comenius University Bratislava

Faculty: Faculty of Mathematics, Physics and Informatics

Course ID:	**Course title:**
FMFI.KJFB/1-OZE-241/22	General Chemistry

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:
written examination - solution of problems, using acquainted knowledge
scale: A 90%, B 80%, C 70%, D 60%, E 51%

Learning outcomes:

Class syllabus:

Recommended literature:

Languages necessary to complete the course:

Notes:

Past grade distribution
Total number of evaluated students: 119

A	B	C	D	E	FX
40,34	46,22	5,04	0,84	0,84	6,72

Lecturers: Ing. Jakub Kaizer, PhD.

Last change: 21.06.2022

Approved by: doc. RNDr. Ivan Sýkora, PhD.

COURSE DESCRIPTION

Academic year: 2025/2026

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. RNDr. Ivan Sýkora, PhD.

COURSE DESCRIPTION

Academic year: 2025/2026

University: Comenius University Bratislava

Faculty: Faculty of Mathematics, Physics and Informatics

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

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

Number of credits: 2

Recommended semester: 1.

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

Prerequisites:

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

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

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

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

Languages necessary to complete the course:

Notes:

Past grade distribution
Total number of evaluated students: 828

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

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

Last change: 21.06.2022

Approved by: doc. RNDr. Ivan Sýkora, PhD.

COURSE DESCRIPTION

Academic year: 2025/2026

University: Comenius University Bratislava

Faculty: Faculty of Mathematics, Physics and Informatics

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

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

Number of credits: 2

Recommended semester: 2.

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

Prerequisites:

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

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

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

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

Languages necessary to complete the course:

Notes:

Past grade distribution
Total number of evaluated students: 541

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

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

Last change: 21.06.2022

Approved by: doc. RNDr. Ivan Sýkora, PhD.

COURSE DESCRIPTION

Academic year: 2025/2026

University: Comenius University Bratislava

Faculty: Faculty of Mathematics, Physics and Informatics

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

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

Number of credits: 2

Recommended semester: 3.

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

Prerequisites:

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

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

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

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

Languages necessary to complete the course:

Notes:

Past grade distribution
Total number of evaluated students: 184

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

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

Last change: 21.06.2022

Approved by: doc. RNDr. Ivan Sýkora, PhD.

COURSE DESCRIPTION

Academic year: 2025/2026

University: Comenius University Bratislava

Faculty: Faculty of Mathematics, Physics and Informatics

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

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

Number of credits: 2

Recommended semester: 4.

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

Prerequisites:

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

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

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

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

Languages necessary to complete the course:

Notes:

Past grade distribution
Total number of evaluated students: 104

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

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

Last change: 21.06.2022

Approved by: doc. RNDr. Ivan Sýkora, PhD.

COURSE DESCRIPTION

Academic year: 2025/2026

University: Comenius University Bratislava

Faculty: Faculty of Mathematics, Physics and Informatics

Course ID:	**Course title:**
FMFI.KJFB/1-OZE-155/22	Hydrology and hydrogeology for environmentalist

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

Number of credits: 3

Recommended semester: 2.

Educational level: I.

Prerequisites:

Course requirements:

Learning outcomes:

Class syllabus:

Recommended literature:

Languages necessary to complete the course:

Notes:

Past grade distribution
Total number of evaluated students: 12

A	B	C	D	E	FX
25,0	25,0	16,67	0,0	25,0	8,33

Lecturers: doc. RNDr. Dávid Krčmář, PhD., RNDr. Ivana Ondrejková, PhD., RNDr. Kamila Hodasová, PhD.

Last change:

Approved by: doc. RNDr. Ivan Sýkora, PhD.

COURSE DESCRIPTION

Academic year: 2025/2026

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: 105

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

Lecturers: Mgr. Ľudmila Hlinová

Last change: 15.03.2022

Approved by: doc. RNDr. Ivan Sýkora, PhD.

COURSE DESCRIPTION

Academic year: 2025/2026

University: Comenius University Bratislava

Faculty: Faculty of Mathematics, Physics and Informatics

Course ID:	**Course title:**
FMFI.KJFB/1-OZE-153/22	Inorganic chemistry

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

Number of credits: 3

Recommended semester: 1.

Educational level: I.

Prerequisites:

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

Learning outcomes:
Students will gain a basic overview of inorganic chemistry, which will include knowledge of atoms, molecules and ions, chemical reactions and their kinetics and acid-base equilibria of various solutions.

Class syllabus:
Change as the basic subject of chemistry. Matter, its states and physico-chemical properties. Structure of atoms and molecules. Periodic law. Chemical formulae and nomeclature. Atomic and molecular mass. Mass spectrometer. Chemical reactions and chemical equations. Properties of solutions. Acid-base and redox reactions and titrations. Energy of chemical reactions. Standard enthalpy of formation. Physical properties of solutions. Chemical kinetics and catalysis. Equilibrium of chemical reactions. Acids and bases. Acid-basic equilibrium and solubility. Laws of thermodynamics.

Recommended literature:
[1] R. Chang: Chemistry. 4th ed., McGraw-Hill (1991);
[2] G.L. Miessler, P.J. Fischer, D.A. Tarr: Inorganic Chemistry. 5th ed., Pearson (2014)

Languages necessary to complete the course:
Slovak, English

Notes:

Past grade distribution
Total number of evaluated students: 10

A	B	C	D	E	FX
30,0	20,0	0,0	0,0	40,0	10,0

Lecturers: Ing. Jakub Kaizer, PhD.
Last change: 17.06.2022
Approved by: doc. RNDr. Ivan Sýkora, PhD.

COURSE DESCRIPTION

Academic year: 2025/2026

University: Comenius University Bratislava

Faculty: Faculty of Mathematics, Physics and Informatics

Course ID:	**Course title:**
FMFI.KAFZM/1-OZE-341/10	Introduction to Physics of the Atmosphere

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: 5.

Educational level: I.

Prerequisites:

Course requirements:

Learning outcomes:

Class syllabus:

Recommended literature:

Languages necessary to complete the course:

Notes:

Past grade distribution
Total number of evaluated students: 37

A	B	C	D	E	FX
37,84	32,43	16,22	10,81	2,7	0,0

Lecturers: doc. RNDr. Martin Gera, PhD., RNDr. Ingrid Damborská, CSc.

Last change: 25.01.2022

Approved by: doc. RNDr. Ivan Sýkora, PhD.

COURSE DESCRIPTION

Academic year: 2025/2026

University: Comenius University Bratislava

Faculty: Faculty of Mathematics, Physics and Informatics

Course ID:	**Course title:**
FMFI.KAFZM/1-OZE-377/22	Introduction to Plasma Physics and Electrical Discharges

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

Number of credits: 3

Recommended semester: 5.

Educational level: I., II.

Prerequisites: FMFI.KEF/1-FYZ-217/22 - Electromagnetism

Antirequisites: FMFI.KEF/1-FYZ-451/15

Course requirements:

Learning outcomes:

Class syllabus:

Recommended literature:

Languages necessary to complete the course:

Notes:

Past grade distribution
Total number of evaluated students: 4

A	B	C	D	E	FX
50,0	50,0	0,0	0,0	0,0	0,0

Lecturers: doc. RNDr. Mário Janda, PhD.

Last change: 21.12.2021

Approved by: doc. RNDr. Ivan Sýkora, PhD.

COURSE DESCRIPTION

Academic year: 2025/2026

University: Comenius University Bratislava

Faculty: Faculty of Mathematics, Physics and Informatics

Course ID:	**Course title:**
FMFI.KJFB/1-OZE-276/24	Introduction to Quantum Mechanics

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:

Learning outcomes:

Class syllabus:

Recommended literature:

Languages necessary to complete the course:

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. RNDr. Radoslav Böhm, PhD.

Last change: 14.06.2024

Approved by: doc. RNDr. Ivan Sýkora, PhD.

COURSE DESCRIPTION

Academic year: 2025/2026

University: Comenius University Bratislava

Faculty: Faculty of Mathematics, Physics and Informatics

Course ID:	**Course title:**
FMFI.KEF/1-FYZ-452/22	Introduction to Solid State Physics

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: 6.

Educational level: I., II.

Prerequisites:

Antirequisites: FMFI.KEF/1-FYZ-452/18

Course requirements:
Continuous assessment: homework, 2 papers
Indicative assessment scale: A 90%, B 80%, C 70%, D 60%, E 50%
Scale of assessment (preliminary/final): Weight of the intermediate / final evaluation: 100/0

Learning outcomes:
After completing the course, students will be actively acquainted with the following basic concepts of solid state physics: ideal crystal, reciprocal space, phonon spectrum, electron band structure and Fermi surface. They will also know how these concepts enter into the simplest analyzes of the thermal, electrical and optical properties of solids.

Class syllabus:
Symmetry classification of substances. Van der Waals-London bond. Liquid-gas transition. Crystals with van der Waals and ionic bonding. Basics of crystallography. Surface tension and nucleation. Diffraction experiments and reciprocal space. Classical and quantum lattice oscillations theory. Metal binding. Chemical bonding. Electron spectrum in an ideal crystal: tight bond method, Bloch's theorem, difference between metals and insulators. Transport phenomena: phenomenological description, Boltzmann's equation. Semiconductors and semiconductor electronics. Response to time-varying fields. Elementary models of dielectric function.

Recommended literature:
http://www.st.fmph.uniba.sk/~hlubina1/
Condensed matter physics : Corrected printing / Michael P. Marder. John Wiley, 2000
Solid-State Physics / H. Ibach, H. Lüth. Springer, 2003
Úvod do fyziky pevných látek / Charles Kittel. Academia, 1985

Languages necessary to complete the course:
Slovak, English

Notes:

Past grade distribution
Total number of evaluated students: 15

A	B	C	D	E	FX
46,67	13,33	6,67	0,0	26,67	6,67

Lecturers: doc. RNDr. Richard Hlubina, DrSc., Mgr. František Herman, PhD.

Last change: 24.02.2022

Approved by: doc. RNDr. Ivan Sýkora, PhD.

COURSE DESCRIPTION

Academic year: 2025/2026

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
37,21	23,84	15,12	11,05	5,23	7,56

Lecturers: doc. PhDr. Ján Rybár, PhD.

Last change: 17.05.2024
Approved by: doc. RNDr. Ivan Sýkora, PhD.

COURSE DESCRIPTION

Academic year: 2025/2026

University: Comenius University Bratislava

Faculty: Faculty of Mathematics, Physics and Informatics

Course ID:	**Course title:**
FMFI.KJFB+KTF/1-FYZ-116/22	Mathematical Methods in Physics (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:

Antirequisites: FMFI.KJFB/1-FYZ-116/15

Course requirements:
For the semester, the student can get 30% (for tests) and the final written exam has a weight of 50%. The student must obtain at least half a point per semester in order to pass the final written exam. Indicative scale: 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 completing the course, students will be able to use advanced mathematical methods necessary to master physics courses. In particular, methods of differential and integral calculus.

Class syllabus:
Scalars and vectors, operations of their use in physics. Linear algebra (solving equations with several variables, linear independence, determinants, matrices). Complex numbers and their use. Limits and derivatives (physical, geometric meaning, rules for calculation, use of derivatives in mathematics and physics - velocity, acceleration, differential, extrema). Integrals (methods of integration - modifications, per partes, substitution). Applications of integrals in physical practice, the principle of superposition (calculation of centers of gravity, moments of inertia, potentials of conservative fields, forces acting between bodies of different shapes). Numerical methods of derivation and integration. Council (Taylor and Mac Laurinov, Fourier work). Differential equations as a basic language of physics (separable DR, homogeneous DR, DR order reduction method, linear DR of the first and second degree, method of variation of constants, method of indeterminate coefficients, method of compiling DR and their use in physics). DR solutions that cannot be solved explicitly (qualitative method, development into a series, numerical method of LDR solution).

Recommended literature:
Matematika pre fyzikov / A. Grega, D. Kluvanec, E. Rajčan. Bratislava : Slovenské pedagogické nakladateľstvo, 1974
Matematický aparát fyziky / Jozef Kvasnica. Praha : Academia, 1997

Matematické metody ve fyzice a technice / John Warren Dettman ; přeložil Jiří Langer ; vedec. red. Miroslav Brdička. Praha : Academia, 1970

Languages necessary to complete the course:
Slovak, English

Notes:

Past grade distribution
Total number of evaluated students: 373

A	B	C	D	E	FX
20,11	11,8	16,89	16,89	21,18	13,14

Lecturers: doc. RNDr. Radoslav Böhm, PhD., prof. RNDr. Fedor Šimkovic, CSc.

Last change: 21.06.2022

Approved by: doc. RNDr. Ivan Sýkora, PhD.

COURSE DESCRIPTION

Academic year: 2025/2026

University: Comenius University Bratislava

Faculty: Faculty of Mathematics, Physics and Informatics

Course ID:	**Course title:**
FMFI.KJFB+KTF/1-FYZ-117/22	Mathematical Methods in Physics (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:

Antirequisites: FMFI.KJFB/1-FYZ-117/15

Course requirements:
For the semester, the student can get 30% (for tests) and the final written exam has a weight of 50%. The student must obtain at least half a point per semester in order to pass the final written exam. Indicative scale: 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 completing the course, students will be able to use advanced mathematical methods necessary to master physics courses. They will be skilled in the use of numerical methods and able to process the measured experimental data.

Class syllabus:
Multiple variable functions. Multidimensional integrals and their use in physics (integration over the "rectangle", integration over the set, substitution method - transformation of the integral into different coordinate systems, calculation of the moment of inertia, calculation of the position of the center of gravity). Vector scalar argument function. Coordinate systems (polar, cylindrical, spherical - volume and area elements, speed determination, accelerations in various bases). Tensors (motivation for the introduction of the tensor - the relationship between the momentum and angular velocity in rotational motion, the moment of inertia tensor and its components, the search for the main axes of the inertia tensor). Curve integrals and their use in physics (curve integrals of the 1st and 2nd kind - work, center of gravity, conservative and non-conservative fields - without criteria). Fundamentals of vector analysis (directional derivation, gradient of scalar function and its Einstein summation convention, Laplace operator in various coordinate systems, rotation and divergence of vector function - creation of "idea" based on analogy with hydrodynamics. Gauss-Ostrogradsky theorem, Stokes theorem and its application Field conservation criteria, area calculation). Fundamentals of statistics (Random variables - discrete and continuous, probability density, Gaussian distribution, calculation of means, standard deviation, applications in physics,

data processing elements, arithmetic mean error, data fitting, minimization of the sum of squares). Partial DR and their use in physics (wave equation, methods of solving partial DR) Numerical methods for solving partial DR.

Recommended literature:

Languages necessary to complete the course:
Slovak, English

Notes:

Past grade distribution
Total number of evaluated students: 295

A	B	C	D	E	FX
23,73	14,58	19,66	17,29	17,29	7,46

Lecturers: doc. RNDr. Radoslav Böhm, PhD., prof. RNDr. Fedor Šimkovic, CSc.

Last change: 21.06.2022

Approved by: doc. RNDr. Ivan Sýkora, PhD.

COURSE DESCRIPTION

Academic year: 2025/2026

University: Comenius University Bratislava

Faculty: Faculty of Mathematics, Physics and Informatics

Course ID:	**Course title:**
FMFI.KJFB/1-BMF-113/16	Mechanics

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., I.II.

Prerequisites:

Course requirements:
For the semester, the student can get 30% (for tests) and the final written exam has a weight of 50%. The student must obtain at least half a point per semester in order to pass the final written exam. Indicative scale: A (100% -91%), B (90% -81%), C (80% -71%), D (70% -61%), E (60% -51%), Fx (50% -0%).
Weight of midterm / final assessment: Midterm assessment 30% / 70% final exam.
Scale of assessment (preliminary/final): 30/70

Learning outcomes:
Upon completion of the course, students will become familiar with the basic concepts of mechanics such as mass, energy, momentum, angular momentum, moment of inertia, frequency; they will understand the meaning of equations of motion, they will know how to use conservation laws (momentum, mechanical energy, momentum), gain the ability to solve equations of motion for systems consisting of several points or bodies, they will understand the nature of rotational motions and harmonic motions.

Class syllabus:
Physical quantities and units. Movement in one dimension. Vectors. Movement in two and three dimensions. Laws of motion. Applications of Newton's laws of motion. Scalar product, work of constant and non-constant force. Conservative forces and their potential. Energy conservation law. Momentum of the system consisting of several mass points, center of gravity, the law of conservation of momentum. Rotational motion, angular velocity, angular acceleration. Angular momentum of the system consisting of several mass points, the law of its preservation. Inertia tensor. Newton's law for simple rotational motion. Equilibrium conditions. Harmonic oscillator. Damped harmonic oscillator, resonance. Statics and dynamics of fluids (Archimedes' law, Pascal's law, continuity equation, Bernoulli's equation).

Recommended literature:
Fyzika část 1. Mechanika : Vysokoškolská učebnice obecnéfyziky / David Halliday, Robert Resnick, Jearl Walker ; přeložili Jana Musilová ... [et al.]. Brno : Vysoké učení technické VUTIUM, 2000 Fyzika pre študujúcich na vysokých školách technických : 1 : mechanika,

akustika, termika / Dionýz Ilkovič. Bratislava: Alfa, 1972 Všeobecná fyzika : 1 : mechanika a molekulová fyzika / Štefan Veis, Ján Maďar, Viktor Martišovitš. Bratislava : Alfa, 1978.
Electronic texts and presentations on the subject's website

Languages necessary to complete the course:

Notes:

Past grade distribution
Total number of evaluated students: 861

A	B	C	D	E	FX
21,6	13,24	12,2	10,34	20,91	21,72

Lecturers: doc. RNDr. Radoslav Böhm, PhD., doc. RNDr. Ivan Sýkora, PhD.

Last change: 20.06.2022

Approved by: doc. RNDr. Ivan Sýkora, PhD.

COURSE DESCRIPTION

Academic year: 2025/2026

University: Comenius University Bratislava

Faculty: Faculty of Mathematics, Physics and Informatics

Course ID:	**Course title:**
FMFI.KJFB+KAFZM/1-OZE-152/22	Molecular Physics

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.

Educational level: I.

Prerequisites:

Course requirements:
For the semester, the student can get 30% (for tests) and the final written exam has a weight of 50%. The student must obtain at least half a point per semester in order to pass the final written exam. Indicative scale: 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:
Course graduates will gain basic knowledge of molecular physics, like knowledge of basic concepts of molecular mechanics and elements of thermodynamics, knowledge of applications of thermodynamics in an ideal classical gas, knowledge of basic applications of probability theory and mathematical statistics in physics.

Class syllabus:
Fundamentals of molecular-kinetic theory (statistical methods for description of systems). Thermodynamics (heat, work, entropy, thermodynamic theorems, state changes and processes in gases). Flow of gases and liquids (flow of diluted gases, laminar and turbulent flow, Bernoulli's equation). Transmission phenomena (heat conduction, convection, thermal conductivity of gases, internal friction of gases, diffusion). Liquids (surface phenomena, phenomena at the interface of the three states). Phase transitions. Real gases (attractive forces between real gas molecules, equations of state for gases, van-der-Waals equation, critical point, Joule-Thomson phenomenon).

Recommended literature:
Fyzika část 2. Mechanika - termodynamika : Vysokoškolská učebnice obecné fyziky / David Halliday, Robert Resnick, Jearl Walker ; přeložili Jan Obdržálek ... [et al.]. Brno : Vysoké učení technické VUTIUM, 2000 Všeobecná fyzika : 1 : mechanika a molekulová fyzika / Štefan Veis, Ján Maďar, Viktor Martišovitš. Bratislava : Alfa, 1978 Fyzika pre študujúcich na vysokých školách technických : 1 : mechanika, akustika, termika / Dionýz Ilkovič. Bratislava : Alfa, 1972. Electronic texts and presentations on the subject's website

Languages necessary to complete the course:

slovak

Notes:

Past grade distribution
Total number of evaluated students: 16

A	B	C	D	E	FX
31,25	37,5	25,0	6,25	0,0	0,0

Lecturers: doc. RNDr. Radoslav Böhm, PhD., prof. RNDr. Zdenko Machala, DrSc.

Last change: 20.06.2022

Approved by: doc. RNDr. Ivan Sýkora, PhD.

COURSE DESCRIPTION

Academic year: 2025/2026

University: Comenius University Bratislava

Faculty: Faculty of Mathematics, Physics and Informatics

Course ID:	**Course title:**
FMFI.KJFB+KAFZM/1-OZE-305/22	Nuclear and Fossil Energy and their Environmental Aspects

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: 5.

Educational level: I.

Prerequisites:

Course requirements:
The course assessment consists of test (30%), and final oral and written exam (70%).
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 30% (test) / 70% final exam.
Scale of assessment (preliminary/final): 30/70

Learning outcomes:
By completing the course, the student will gain basic knowledge about non-renewable energy sources, specifically nuclear and fossil energy. In the first part of the course, students will gain a basic understanding of nuclear and neutron physics, fission physics and reactor physics. They will also gain knowledge about the operation of nuclear power plants and their impact on the environment as well as methods for monitoring radioactivity in the environment.
In the second part of the lecture, the student will be acquainted with the basic use of fossil fuels (oil, natural gas, coal) in energy and transportation sectors, as well as with their impact on the environment.

Class syllabus:
Impact of the energy sector on the environment. Fundamentals of nuclear and neutron physics. Neutron distribution. Interaction of neutrons with atomic nuclei. Nuclear fission. Nuclear reactors. Principle of operation of a nuclear reactor. Multiplication factor. Nuclear power plant scheme. Nuclear fuel, moderator, coolant, core, primary and secondary circuits, heat dissipation, shielding, reactor types, prospects for the development of nuclear reactors and nuclear power. Safety of nuclear power plants and their impact on the environment. Sources of activity in nuclear reactors, barriers preventing radionuclide leakage, containment. Radioactive waste, its treatment and disposal. Fuel cycle, the impact of its stages on the environment. Human exposure pathways, radionuclides in the food chain, critical exposure pathways. Risk to the population in the vicinity of nuclear power plants. Accidents in the operation of nuclear power plants. Prospects for the development of nuclear reactors. Radionuclides in the environment. Monitoring of radioactivity in the natural environment. Current state and forecasts of energy production and consumption. Renewable vs. non-renewable energy sources, energy density of energy sources. Fundamentals of the combustion process. Fossil

fuels (oil, natural gas, coal). Use of fossil fuels in energy (thermal power plant, steam-gas power plant, cogeneration, trigeneration). Use of fossil fuels in transportation (petrol, diesel, compressed natural gas, liquefied petroleum gas). Environmental aspects of fossil energy. By-products of combustion processes (exhaust gases, greenhouse gases).

Recommended literature:

V. Slugeň et al.: Jadrové zariadenia, jadrová bezpečnosť, SNUS (2009);
M. Florek: Experimentálna jadrová a subjadrová fyzika: Časť neutrónová fyzika. Univerzita Komenského v Bratislave (1992);
D. A. Tillman: The combustion of solid fuels and wastes, Academic Press (1991);
S. McAllister et al.: Fundamentals of Combustion Processes: Springer (2011);
S. R. Turns: An Introduction to Combustion: Concepts and Applications, McGraw-Hill Companies (2012);

Languages necessary to complete the course:
Slovak in combination with English (some of the suggested readings are in English)

Notes:

Past grade distribution
Total number of evaluated students: 40

A	B	C	D	E	FX
57,5	15,0	12,5	0,0	7,5	7,5

Lecturers: doc. RNDr. Monika Müllerová, PhD., Mgr. Richard Cimerman, PhD., RNDr. Terézia Eckertová, PhD.

Last change: 21.06.2022

Approved by: doc. RNDr. Ivan Sýkora, PhD.

COURSE DESCRIPTION

Academic year: 2025/2026

University: Comenius University Bratislava

Faculty: Faculty of Mathematics, Physics and Informatics

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

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

Number of credits: 2

Recommended semester: 2., 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: 201

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

Lecturers: Mgr. Xenia Daniela Poslon, PhD.

Last change: 06.09.2023

Approved by: doc. RNDr. Ivan Sýkora, PhD.

COURSE DESCRIPTION

Academic year: 2025/2026

University: Comenius University Bratislava

Faculty: Faculty of Mathematics, Physics and Informatics

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

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

Number of credits: 2

Recommended semester: 1., 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: 201

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

Lecturers: Mgr. Xenia Daniela Poslon, PhD.

Last change: 06.09.2023

Approved by: doc. RNDr. Ivan Sýkora, PhD.

COURSE DESCRIPTION

Academic year: 2025/2026

University: Comenius University Bratislava

Faculty: Faculty of Mathematics, Physics and Informatics

Course ID:	**Course title:**
FMFI.KAFZM/1-OZE-275/15	Physical Aspects of a Geographical System

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

Number of credits: 4

Recommended semester: 2.

Educational level: I.

Prerequisites:

Antirequisites: FMFI.KAFZM/2-FMK-146/00

Course requirements:

Learning outcomes:

Class syllabus:

Recommended literature:

Languages necessary to complete the course:

Notes:

Past grade distribution
Total number of evaluated students: 50

A	B	C	D	E	FX
70,0	18,0	10,0	2,0	0,0	0,0

Lecturers: RNDr. Marián Melo, PhD.

Last change: 25.01.2022

Approved by: doc. RNDr. Ivan Sýkora, PhD.

COURSE DESCRIPTION

Academic year: 2025/2026

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: 7053

A	B	C	D	E	FX
93,31	1,6	0,21	0,0	0,07	4,81

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

Last change: 16.06.2022
Approved by: doc. RNDr. Ivan Sýkora, PhD.

COURSE DESCRIPTION

Academic year: 2025/2026

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: 5840

A	B	C	D	E	FX
95,6	1,51	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
Last change: 15.03.2022
Approved by: doc. RNDr. Ivan Sýkora, PhD.

COURSE DESCRIPTION

Academic year: 2025/2026

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: 3268

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

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

Last change: 16.06.2022

Approved by: doc. RNDr. Ivan Sýkora, PhD.

COURSE DESCRIPTION

Academic year: 2025/2026

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: 2956

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

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

Last change: 15.03.2022

Approved by: doc. RNDr. Ivan Sýkora, PhD.

COURSE DESCRIPTION

Academic year: 2025/2026

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: 2172

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

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

Last change: 15.03.2022

Approved by: doc. RNDr. Ivan Sýkora, PhD.

COURSE DESCRIPTION

Academic year: 2025/2026

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: 204

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

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

Last change: 15.03.2022

Approved by: doc. RNDr. Ivan Sýkora, PhD.

STATE EXAM DESCRIPTION

Academic year: 2025/2026	
University: Comenius University Bratislava	
Faculty: Faculty of Mathematics, Physics and Informatics	
Course ID: FMFI.KJFB/1-OZE-953/15	**Course title:** Physics
Number of credits: 2	
Educational level: I.	
State exam syllabus:	
Last change: 15.02.2023	
Approved by: doc. RNDr. Ivan Sýkora, PhD.	

COURSE DESCRIPTION

Academic year: 2025/2026

University: Comenius University Bratislava

Faculty: Faculty of Mathematics, Physics and Informatics

Course ID:	**Course title:**
FMFI.KJFB/1-OZE-372/10	Practical Training in Radiometry and Spectrometry

Educational activities:
Type of activities: laboratory practicals
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., I.II.

Prerequisites:

Course requirements:
Preliminary evaluation: elaboration of laboratory protocols.
Final evaluation: presentation of the results.
Indicative evaluation scale: A 90%, B 80%, C 70%, D 60%, E 50%.
Scale of assessment (preliminary/final): 80/20

Learning outcomes:
Upon completion of the course, students will gain practical experience in the use of spectrometric and radiometric methods.

Class syllabus:
Study of the basic characteristics of the semiconductor spectrometer. Study of the analysis of a complex gamma spectra. Investigation of the properties of a large area gas counter. Determination of the integral alpha and beta activity of solid samples. Measurement of radon activity concentration by scintillation chamber. Determination of detection efficiency in quenched samples in liquid scintillation technique. Analysis of air samples by semiconductor alpha spectrometer. Determination of radionuclide activity based on dose rate.

Recommended literature:
Gamma and X-Ray spectrometry with semiconductor detectors / Klaus Debertin, Richard G. Helmer. Amsterdam : Elsevier, 1988
Státní úřad pro jadernou bezpečnost: Stanovení radonového indexu pozemku přímým měřením, SÚJB, 2012

Languages necessary to complete the course:
Slovak, English

Notes:

Past grade distribution
Total number of evaluated students: 5

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

Lecturers: doc. RNDr. Ivan Sýkora, PhD., doc. RNDr. Monika Müllerová, PhD., Mgr. Ivan Kontuľ, PhD., RNDr. Terézia Eckertová, PhD.

Last change: 21.06.2022

Approved by: doc. RNDr. Ivan Sýkora, PhD.

COURSE DESCRIPTION

Academic year: 2025/2026

University: Comenius University Bratislava

Faculty: Faculty of Mathematics, Physics and Informatics

Course ID:	**Course title:**
FMFI.KJFB/1-FYZ-322/22	Practical in atomic and nuclear physics

Educational activities:
Type of activities: laboratory practicals / independent work
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: 6.

Educational level: I., I.II.

Prerequisites:

Recommended prerequisites:
1-FYZ-231/22 Introduction to Modern Physics (Physics 2/S)

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

Learning outcomes:
Gain experimental skills with used instrumentation, registration of ionizing radiation and processing of measured data. In the realized experiments, make sure of the agreement of experiments and theories that clarify them.

Class syllabus:
In the introductory exercise, students will get acquainted with the methods used to process electrical pulses from ionizing radiation detectors (differential discriminator, single-channel and multi-channel analyzer). Separate laboratory exercises follow
- from atomic physics: Franck-Hertz experiment (verification of Bohr's postulates), Stefan-Boltzmann's law (radiation of an absolutely black body), range of alpha particles in air (principles of semiconductor detectors)
- from nuclear physics: statistical nature of nuclear transformations, determination of gamma radiation energy (principles of scintillation detectors), verification of Compton scattering
- from applied nuclear physics: measurement of air radioactivity (principles of Geiger-Müller detectors).

Recommended literature:
- instructions for exercises at http://www.dnp.fmph.uniba.sk/~kollar/navodnik.htm
- Physics practicum IV: Atomic physics and ionizing radiation detection / Matej Florek ... [et al.]. Bratislava: Comenius University, 1988

Languages necessary to complete the course:
Slovak, English.

Notes:
Recommended range of instruction (in hours): 39
Weekly: 2P + 1H Period of study: 27 P (9 weeks x3h) +12 H (4 weeks x3h)

Past grade distribution
Total number of evaluated students: 37

A	B	C	D	E	FX
83,78	10,81	0,0	0,0	5,41	0,0

Lecturers: doc. RNDr. Monika Müllerová, PhD., doc. RNDr. Miroslav Ješkovský, PhD., RNDr. Miroslav Pikna, PhD.

Last change: 24.02.2022

Approved by: doc. RNDr. Ivan Sýkora, PhD.

COURSE DESCRIPTION

Academic year: 2025/2026

University: Comenius University Bratislava

Faculty: Faculty of Mathematics, Physics and Informatics

Course ID:	**Course title:**
FMFI.KEF/1-FYZ-222/22	Practical in electricity and magnetism

Educational activities:
Type of activities: laboratory practicals / independent work
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., I.II.

Prerequisites: FMFI.KEF/1-FYZ-217/22 - Electromagnetism or FMFI.KEF/1-TEF-204/22 - Electricity and Magnetism

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

Learning outcomes:
Acquisition of skills in registration and data processing by computer, measurement of electrical and magnetic quantities. Physical interpretation and written / graphic presentation of processed results.

Class syllabus:
In the initial two or three exercises, joint acquisition of skills and measurement with analog and digital devices (oscilloscope, digital multimeter, A / D converter), processing of measured data by computer. This is followed by five to six separate laboratory works on electricity and magnetism selected from the offer: electrical properties of substances - electric bridges, Hall effect; electric field mapping; magnetic field mapping - air coils; electromagnetic induction - transformer; electrical RLC oscillations - transient RLC phenomenon, serial and parallel RLC circuit; magnetic properties of substances - hysteresis loops, permeability of substances, separation of magnetic losses; fuel cell; determination of the specific charge of an electron (e / m0).

Recommended literature:
- e-learning systém k predmetu s aktualizovanými podkladmi k experimentom
- Fyzikálne praktikum II : Návody na praktické cvičenia z elektriny a magnetizmu / Ján Pavlík. Bratislava : Univerzita Komenského, 2002
- Elektromagnetizmus, Andrej Tirpák, Bratislava: Polygrafia SAV, 1999

Languages necessary to complete the course:
Slovak, English (designations of instrument controls and their manuals)

Notes:
Recommended range of instruction (in hours): 39
Weekly: 2P + 1H Period of study: 27 P (9 weeks x3h) +12 H (4 weeks x3h)

Past grade distribution
Total number of evaluated students: 85

A	B	C	D	E	FX
61,18	25,88	3,53	2,35	2,35	4,71

Lecturers: doc. RNDr. Tomáš Roch, Dr. techn., Mgr. Branislav Grančič, PhD., Ing. Pavol Ďurina, PhD., doc. RNDr. Juraj Országh, PhD., Mgr. Leonid Satrapinskyy, PhD., Mgr. Ľubomír Staňo, PhD., Mgr. Veronika Hidaši Turiničová, PhD.

Last change: 21.06.2022

Approved by: doc. RNDr. Ivan Sýkora, PhD.

COURSE DESCRIPTION

Academic year: 2025/2026

University: Comenius University Bratislava

Faculty: Faculty of Mathematics, Physics and Informatics

Course ID:	**Course title:**
FMFI.KEF/1-FYZ-221/22	Practical in mechanics and molecular physics

Educational activities:
Type of activities: laboratory practicals / independent work
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: 3.

Educational level: I.

Prerequisites:

Course requirements:
Continuous assessment: control of preparation for the internship, elaboration of reports from internships
Indicative assessment scale: A 90%, B 80%, C 70%, D 60%, E 50%
Scale of assessment (preliminary/final): Weight of the intermediate / final evaluation: 100/0

Learning outcomes:
Deepening and use of theoretical knowledge of mechanics and molecular physics, mastering basic physical measurement methods. The student will master the basic habits of independent scientific work in physical research: working with literature, keeping laboratory protocol, obtaining experimental erudition, critical evaluation of measurement and physical interpretation of processed results, written processing of individual physical problems in the form of a paper.

Class syllabus:
In practice, students will gain skills in experimental verification of some basic physical laws (gravitational, Hook's, equation of state, etc.), quantitative investigation of physical events (state changes, oscillations, polytropic action, etc.) and measurement of some basic physical quantities (modules elasticity, density, viscosity, speed of sound, air humidity, surface tension, gravitational constant, gravitational acceleration,…).
Tasks: Density measurement. Measurement of modulus of elasticity. Vibrations of coupled pendulums. Measurement of gravity acceleration. Moment of inertia measurement. Gravitational constant measurement. Heat capacity measurement. Group heat measurement. Determination of dynamic viscosity of fluids. Measurement of dynamic viscosity of liquids by commercial viscometers. The fall of a sphere in a confined gaseous environment. Polytropic story. Determination of surface tension of liquids. Measurement of relative and absolute humidity. Measuring the speed of sound in air. Basic properties of oscillating motion.
Some tasks are equipped with sensors and transducers that allow the registration and processing of measured data by computers. For some tasks, conventional measuring instruments and aids are used.

Recommended literature:

Practicum in Mechanics and Molecular Physics / Nadežda Zrubáková, Elena Brežná, Božena Pisoňová. Bratislava: Comenius University, 2003
Practicum in Mechanics and Molecular Physics / Nadežda Zrubáková, Elena Brežná, Božena Pisoňová. Bratislava: Comenius University, 1999

Languages necessary to complete the course:
Slovak and English

Notes:
Recommended range of instruction (in hours): 39
Weekly: 2P + 1H Period of study: 27 P (9 weeks x3h) +12 H (4 weeks x3h)

Past grade distribution
Total number of evaluated students: 80

A	B	C	D	E	FX
62,5	12,5	10,0	3,75	1,25	10,0

Lecturers: doc. RNDr. Juraj Országh, PhD., doc. RNDr. Veronika Medvecká, PhD., RNDr. Ladislav Moravský, PhD., doc. RNDr. Anna Zahoranová, PhD., doc. Mgr. Dušan Kováčik, PhD.

Last change: 22.02.2022

Approved by: doc. RNDr. Ivan Sýkora, PhD.

COURSE DESCRIPTION

Academic year: 2025/2026

University: Comenius University Bratislava

Faculty: Faculty of Mathematics, Physics and Informatics

Course ID:	**Course title:**
FMFI.KEF/1-FYZ-321/22	Practical in optics

Educational activities:
Type of activities: laboratory practicals / independent work
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: 5.

Educational level: I., I.II.

Prerequisites:

Recommended prerequisites:
1-FYZ-218/22 Optics (Physics 2/S), or 1-UFY-210/00 Waves and Optics (Physics Teacher Training in combination 2/S), or 1-TEF-205 Optics (Technical Physics 2/S)
or 1-FYZ-211/17 Electromagnetism and Optics (Physics 2/W)

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

Learning outcomes:
Physical interpretation and written / graphic presentation of processed results.

Class syllabus:
Through a series of measurements, we get acquainted with basic concepts and phenomena such as: light sources - radiation - reflectivity - absorption - photometry - basic photometric quantities. Next, we examine phenomena such as - light interference (two-beam interference, multi-beam interference), diffraction, light dispersion, refractive index, light polarization, optical activity. From the lecture we will repeat the basics of optical imaging - geometric optics and explain the construction of selected optical instruments, such as: photometer, microscope, telescope, monochromator, spectrometer, refractometer, interferometer, etc.) Some will be constructed and their parameters verified. We will measure some basic physical constants.
Each mathematical formulation of the investigated physical dependence (phenomenon) can be transformed into a certain measurable dependence (dependent on the so-called parameters). These are usually of various importance in terms of the phenomenon under study. In addition to storing the measured data, it is appropriate to display the measured data continuously graphically, which allows, especially when compared with the expected functional dependence, better visual inspection and more prompt detection and possible elimination of found errors.
There is a computer for each task. It includes instructions for the task, a program for evaluating measurements and graphical display of measured data and a program for a virtual experiment in

the case of distance learning or. the need to carry out a parallel experiment to better understand the phenomenon. The measured tasks and their selection can be adapted to the respective field of study.

Recommended literature:
- Web = instructions for the subject with updated data for experiments
- Pavel Vojtek: Practical exercises in optics, MFF UK, 1992, scripts
- Štrba A., Mesároš V., Senderáková D .: Optics with Examples, MFF UK, 1996, scripts

Languages necessary to complete the course:
Slovak, English (designations of instrument controls and their manuals)

Notes:
Recommended range of instruction (in hours): 39
Weekly: 2P + 1H Period of study: 27 P (9 weeks x3h) +12 H (4 weeks x3h)

Past grade distribution
Total number of evaluated students: 35

A	B	C	D	E	FX
71,43	25,71	2,86	0,0	0,0	0,0

Lecturers: RNDr. Ján Greguš, PhD., Mgr. Michaela Horňáčková, PhD., RNDr. Pavel Vojtek, CSc., RNDr. Zuzana Zábudlá, Mgr. Branislav Grančič, PhD.

Last change: 22.02.2022

Approved by: doc. RNDr. Ivan Sýkora, PhD.

COURSE DESCRIPTION

Academic year: 2025/2026

University: Comenius University Bratislava

Faculty: Faculty of Mathematics, Physics and Informatics

Course ID:	**Course title:**
FMFI.KJFB/1-BMF-310/00	Quantum Mechanics

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: 5.

Educational level: I.

Prerequisites:

Course requirements:

Learning outcomes:

Class syllabus:
1. Experimental starting points of quantum theory. 2. Phoelectric effect and black body radiation. 3. Introduction of wave mechanics. 4. Schrodinger equation and properties of its solutions. 5. Applications on hydrogen atom and other simple exactly solvable systems. 6. Angular momentum and spin. 8. Approximative methods of quantum mechanics. 9. Perturbation and variational methods. 10. Quantum tunneling and possible aplications of quantum mechanics in chemistry and biology. 11. Epistomological questions of quantum mechanics. 12. Relativistic quantum theory.

Recommended literature:
L. Schiff.: Quantum Mechanics, McGraw Hill, 1985.
A. Davydov, Quantum Mechanics in Biology, Kluwer, 1990.

Languages necessary to complete the course:

Notes:

Past grade distribution
Total number of evaluated students: 166

A	B	C	D	E	FX
50,6	28,92	15,06	3,01	0,6	1,81

Lecturers: prof. RNDr. Peter Babinec, CSc., Mgr. Ivan Sukuba, PhD.

Last change: 02.06.2015

Approved by: doc. RNDr. Ivan Sýkora, PhD.

COURSE DESCRIPTION

Academic year: 2025/2026

University: Comenius University Bratislava

Faculty: Faculty of Mathematics, Physics and Informatics

Course ID:	**Course title:**
FMFI.KAFZM/1-OZE-304/22	Renewable Energy Sources

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: -
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:
By completing the course, the student will gain basic knowledge about renewable energy sources, their physical principles, exploitability, and current technologies.

Class syllabus:
Renewable energy sources, their position and importance in the energy mix of countries, their general advantages, disadvantages. Current state and forecasts of renewable energy production. Wind energy (principles, technologies, environmental impact). Hydropower (principles, technologies, environmental impact). Solar energy (principles of solar thermal energy as well as the production of electricity using photovoltaic cells, technology, environmental impact). Geothermal energy (principles, technology). Heat pumps. Energy of sea currents. Biomass energy. Fundamentals of hydrogen energy. Brief evaluation of the exploitability of individual renewable resources in real conditions. Carbon footprint of renewable energy sources.

Recommended literature:
M. Morvová: Princípy metód a využitie obnoviteľných zdrojov energie, Knižničné a edičné centrum FMFI UK (2008);
D. J. C. MacKay: Obnoviteľné zdroje energie – s chladnou hlavou, Slovenská inovačná a energetická agentúra (2013);
R. Ehrlich, H. A. Geller: Renewable Energy – A First Course, CRC Press (2018);
J. Andrews, N. Jelley: Energy Science: Principles, Technologies, and Impacts, Oxford University Press (2007).

Languages necessary to complete the course:
Slovak in combination with English (some of the suggested readings are in English)

Notes:

Past grade distribution
Total number of evaluated students: 90

A	B	C	D	E	FX
92,22	7,78	0,0	0,0	0,0	0,0

Lecturers: doc. RNDr. Marcela Morvová, PhD., Mgr. Richard Cimerman, PhD.

Last change: 14.03.2022

Approved by: doc. RNDr. Ivan Sýkora, PhD.

COURSE DESCRIPTION

Academic year: 2025/2026

University: Comenius University Bratislava

Faculty: Faculty of Mathematics, Physics and Informatics

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

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

Number of credits: 2

Recommended semester: 1.

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

Prerequisites:

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

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

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

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

Languages necessary to complete the course:

Notes:

Past grade distribution
Total number of evaluated students: 738

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

Lecturers: Viktoria Mirsalova

Last change: 20.06.2022

Approved by: doc. RNDr. Ivan Sýkora, PhD.

COURSE DESCRIPTION

Academic year: 2025/2026

University: Comenius University Bratislava

Faculty: Faculty of Mathematics, Physics and Informatics

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

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

Number of credits: 2

Recommended semester: 2.

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. RNDr. Ivan Sýkora, PhD.

COURSE DESCRIPTION

Academic year: 2025/2026

University: Comenius University Bratislava

Faculty: Faculty of Mathematics, Physics and Informatics

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

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

Number of credits: 2

Recommended semester: 3.

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

Prerequisites:

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

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

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

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

Languages necessary to complete the course:

Notes:

Past grade distribution
Total number of evaluated students: 212

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

Lecturers: Viktoria Mirsalova

Last change: 20.06.2022

Approved by: doc. RNDr. Ivan Sýkora, PhD.

COURSE DESCRIPTION

Academic year: 2025/2026

University: Comenius University Bratislava

Faculty: Faculty of Mathematics, Physics and Informatics

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

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

Number of credits: 2

Recommended semester: 4.

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. RNDr. Ivan Sýkora, PhD.

COURSE DESCRIPTION

Academic year: 2025/2026

University: Comenius University Bratislava

Faculty: Faculty of Mathematics, Physics and Informatics

Course ID:	**Course title:**
FMFI.KAI/2-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. RNDr. Ivan Sýkora, PhD.

COURSE DESCRIPTION

Academic year: 2025/2026

University: Comenius University Bratislava

Faculty: Faculty of Mathematics, Physics and Informatics

Course ID:	**Course title:**
FMFI.KJFB+KEF/1-OZE-920/10	Seminar in BSc Project

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: 6.

Educational level: I.

Prerequisites:

Course requirements:
For the semester, the student can get 50% for the preparation of the bachelor thesis project; the final presentation has a weight of 50%. A student must earn at least half of the points for the preparation of the bachelor thesis project in order to pass the final presentation. The student must also score at least 26 points on the final presentation.
Grades: A (100-91), B (90-81), C (80-71), D (70-61), E (60-51), FX (50-0).
Mid-term / final assessment weighting: 50% mid-term assessment (bachelor thesis project) / 50% final presentation.
Scale of assessment (preliminary/final): 50/50

Learning outcomes:
Students will learn the methods of working on an expert project. They will also acquire the necessary knowledge to complete the bachelor thesis.

Class syllabus:
Methodological procedures for developing the structure and timetable for the solution of the assigned project, work with literature, methods of data acquisition.
What is expected from the students: First public presentation on the assigned topic of the bachelor's thesis, clear formulation of the content and objectives of the thesis, ideas about the methods of solution, analysis of ambiguities. Joint analysis of speeches of individual students.

Recommended literature:
Provided by the bachelor thesis supervisor

Languages necessary to complete the course:
Slovak, English

Notes:

Past grade distribution Total number of evaluated students: 57					
A	B	C	D	E	FX
96,49	0,0	0,0	0,0	0,0	3,51
Lecturers: doc. RNDr. Ivan Sýkora, PhD., doc. RNDr. Karol Hensel, PhD.					
Last change: 22.06.2022					
Approved by: doc. RNDr. Ivan Sýkora, PhD.					

COURSE DESCRIPTION

Academic year: 2025/2026

University: Comenius University Bratislava

Faculty: Faculty of Mathematics, Physics and Informatics

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

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

Number of credits: 2

Recommended semester: 1.

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

Prerequisites:

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

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

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

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

Languages necessary to complete the course:

Notes:

Past grade distribution
Total number of evaluated students: 113

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

Lecturers: Mgr. Aneta Barnes

Last change: 21.06.2022

Approved by: doc. RNDr. Ivan Sýkora, PhD.

COURSE DESCRIPTION

Academic year: 2025/2026

University: Comenius University Bratislava

Faculty: Faculty of Mathematics, Physics and Informatics

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

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

Number of credits: 2

Recommended semester: 2.

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

Prerequisites:

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

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

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

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

Languages necessary to complete the course:

Notes:

Past grade distribution
Total number of evaluated students: 86

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

Lecturers: Mgr. Aneta Barnes

Last change: 21.06.2022

Approved by: doc. RNDr. Ivan Sýkora, PhD.

COURSE DESCRIPTION

Academic year: 2025/2026

University: Comenius University Bratislava

Faculty: Faculty of Mathematics, Physics and Informatics

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

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

Number of credits: 2

Recommended semester: 3.

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. RNDr. Ivan Sýkora, PhD.

COURSE DESCRIPTION

Academic year: 2025/2026

University: Comenius University Bratislava

Faculty: Faculty of Mathematics, Physics and Informatics

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

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

Number of credits: 2

Recommended semester: 4.

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. RNDr. Ivan Sýkora, PhD.

COURSE DESCRIPTION

Academic year: 2025/2026

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: 300

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

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

Last change: 16.06.2022
Approved by: doc. RNDr. Ivan Sýkora, PhD.

COURSE DESCRIPTION

Academic year: 2025/2026

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: 297

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

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

COURSE DESCRIPTION

Academic year: 2025/2026

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: 55

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

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

COURSE DESCRIPTION

Academic year: 2025/2026

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: 40

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

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

COURSE DESCRIPTION

Academic year: 2025/2026

University: Comenius University Bratislava

Faculty: Faculty of Mathematics, Physics and Informatics

Course ID:	**Course title:**
FMFI.KJP/1-MXX-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: 68

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

Lecturers: Mgr. Ing. Jana Kočvarová

Last change: 11.04.2024
Approved by: doc. RNDr. Ivan Sýkora, PhD.

COURSE DESCRIPTION

Academic year: 2025/2026

University: Comenius University Bratislava

Faculty: Faculty of Mathematics, Physics and Informatics

Course ID:	**Course title:**
FMFI.KJP/1-MXX-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. RNDr. Ivan Sýkora, PhD.

COURSE DESCRIPTION

Academic year: 2025/2026

University: Comenius University Bratislava

Faculty: Faculty of Mathematics, Physics and Informatics

Course ID:	**Course title:**
FMFI.KTF/1-FYZ-251/15	Theoretical Mechanics

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: 3.

Educational level: I.

Prerequisites:

Course requirements:
Scale of assessment (preliminary/final): 20/80

Learning outcomes:
After completing the course, students will understand and be able to use the material listed in the Brief syllabus of the course. In this way they will be well prepared for further theoretical physics courses.

Class syllabus:
Lagrangian and Hamiltonian formalism, the least action principle, scaling and similar solutions, two-body problem and Kepler's problem, small oscillations, perturbation theory, Euler's equations for solid body rotation, stress tensor and surface forces, ideal and viscous fluid equations, Hook's law, waves in an elastic continuum and in an ideal fluid.

Recommended literature:
Theoretical mechanics / Miroslav Brdička, Arnošt Hladík. Prague: Academia, 1987
Mechanics in Physics / Jan Horský, Jan Novotný, Milan Štefaník. Prague: Academia, 2001
Fecko, M .: Extended Syllabus and Problems in Theoretical Mechanics [40 pages, available electronically
J.Langer, J.Podolský: Theoretical Mechanics, electronically at http://utf.mff.cuni.cz/vyuka/OFY003/
J.Tillich, L.Richterek: Classical Mechanics, electronically at http://muj.optol.cz/richterek/lib/exe/fetch.php?media=mechanika:mechanika.pdf

Languages necessary to complete the course:
Slovak, English

Notes:

Past grade distribution Total number of evaluated students: 249					
A	B	C	D	E	FX
41,37	12,45	12,05	10,04	11,65	12,45
Lecturers: doc. RNDr. Marián Fecko, PhD.					
Last change: 08.03.2022					
Approved by: doc. RNDr. Ivan Sýkora, PhD.					

COURSE DESCRIPTION

Academic year: 2025/2026

University: Comenius University Bratislava

Faculty: Faculty of Mathematics, Physics and Informatics

Course ID:	**Course title:**
FMFI.KJFB/1-BMF-351/15	Thermodynamics and Statistical Physics

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: 6

Recommended semester: 6.

Educational level: I., I.II.

Prerequisites:

Course requirements:
Preliminary evaluation: individual work - project (30 %)
Final exam: written and oral (70 %)
Indicative evaluation scale: 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
Scale of assessment (preliminary/final): 30/70

Learning outcomes:
After the course, students are able to use the principles and methods of thermodynamics and statistical physics in practice.

Class syllabus:
Mathematiical introduction, probability and statistics. First law of thermodynamics. Second law of thermodynamics. Heat engines. Entropy from thermodynamics point of view. Ideal gas. Statistics of system of spins. Statistics of particles in a box. Termal contact between physical systems. System in termal contact with reservoir. Canonical distribution. Paramagnetism. Curie's law. Mean energy of an ideal gas of monoatomic molecules. Entropy change at low heat transfer, entropy measurement principle. Statistical physics of classical particles (concept of state and number of available states for the classical system, canonical distribution in the classical approximation, equipartition law, specific heat capacities). Thermal and diffusion contact between systems (thermal and diffusion equilibrium conditions, chemical potential, large canonical distribution). Quantum ideal gases (Fermi and Bose statistics. Quantum ideal gas in the classical limit. Boltzmann distribution. Barometric formula, chemical reactions, statistics of conductivity electrons in metal. Fermi energy of degenerate gas. Phase equilibrium and phase transitions. Transfer phenomena.

Recommended literature:
Statistická fyzika / Jozef Kvasnica. Praha : Academia, 1983 Štatistická fyzika / Rudolf Zajac, Ján Pišút. Bratislava : Univerzita Komenského, 1995 Termodynamika a štatistická fyzika : Zbierka úloh / František Čulík, Rudolf Zajac. Bratislava : Univerzita Komenského, 1985 Úvod

do štatistickej fyziky a termodynamiky / Milan Noga, František Čulík. Bratislava : Univerzita Komenského, 1975

Languages necessary to complete the course:
slovak, english

Notes:

Past grade distribution
Total number of evaluated students: 107

A	B	C	D	E	FX
29,91	22,43	22,43	14,95	9,35	0,93

Lecturers: prof. RNDr. Stanislav Tokár, DrSc., doc. RNDr. Radoslav Böhm, PhD., doc. Mgr. Pavol Bartoš, PhD.

Last change: 20.06.2022

Approved by: doc. RNDr. Ivan Sýkora, PhD.

COURSE DESCRIPTION

Academic year: 2025/2026

University: Comenius University Bratislava

Faculty: Faculty of Mathematics, Physics and Informatics

Course ID:	**Course title:**
FMFI.KEF/1-TEF-211/19	Thermophysics

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

Number of credits: 5

Recommended semester: 4.

Educational level: I.

Prerequisites:

Course requirements:

Learning outcomes:

Class syllabus:
Thermal properties of materials: thermal conductivity, boundary conditions, mathematical description of heat transfer. Thermal conductivity of composits. Measurement of thermophysical parameters. Radiative heat transfer. thermoelectric phenomena.

Recommended literature:
Convective heat and mass transfer / W. M. Kays, M. E. Crawford. New York : McGraw-Hill, 1993
Radiative heat transfer / Michael F. Modest. New York : McGraw-Hill, 1993
Ozisik M.N.: Heat Transfer: A Basic Approach McGraw-Hill Book Comp.
F. Incropera et al: Incropera's principles of Heat and Mass Transfer, J Willey 2017

Languages necessary to complete the course:
English

Notes:

Past grade distribution
Total number of evaluated students: 16

A	B	C	D	E	FX
25,0	12,5	18,75	25,0	0,0	18,75

Lecturers: doc. Ing. Peter Bokes, PhD.

Last change: 17.02.2022

Approved by: doc. RNDr. Ivan Sýkora, PhD.

COURSE DESCRIPTION

Academic year: 2025/2026

University: Comenius University Bratislava

Faculty: Faculty of Mathematics, Physics and Informatics

Course ID:	**Course title:**
FMFI.KEF/1-UFY-210/22	Waves and Optics

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

Number of credits: 5

Recommended semester: 4.

Educational level: I., I.II.

Prerequisites:

Course requirements:
Continuous assessment: written tests (2x10 marks), lab reports (2x15 marks)
Exam: written (30 marks), oral (20 marks)
Indicative assessment scale: A 90%, B 80%, C 70%, D 60%, E 50%
Credits will be awarded if the student obtains at least 50% marks.

Learning outcomes:
Graduates have a systematic knowledge of mechanical waves (including sound) and wave optics at the level of a core university physics course. They have an idea of the boundaries between graduation and university physics in the field of wave optics from the point of view of work with high school youth with an increased interest in physics.

Class syllabus:
Oscillations and oscillating systems (modes, resonators, oscillations and waves, Fourier analysis of oscillations). Waves (harmonic waves, complex notation, wave superposition, wave polarization, Doppler effect, wave diffraction, waves in physics, and waves at boundaries). Wave optics (light interference, light diffraction, holography, light dispersion in dielectrics, dispersion, polarization by reflection and refraction, spreading of light in anisotropic conditions). Geometrical optics and basics of optical projection. Photo metrics. Contemporary problems in optics.

Recommended literature:

Languages necessary to complete the course:
Slovak ad English.

Notes:

Past grade distribution
Total number of evaluated students: 156

A	B	C	D	E	FX
26,92	21,79	26,92	15,38	8,33	0,64

Lecturers: prof. RNDr. Pavel Veis, CSc.

Last change: 18.06.2022
Approved by: doc. RNDr. Ivan Sýkora, PhD.