

## Course descriptions

### TABLE OF CONTENTS

1. 1-AIN-245/22	3D Technologies, Robotics and Artificial Intelligence.....	4
2. 1-AIN-955/15	Applied Informatics ( <b>state exam</b> ).....	6
3. 1-AIN-426/22	Applied Robotics Seminar (1).....	9
4. 1-AIN-427/22	Applied Robotics Seminar (2).....	11
5. 1-AIN-920/22	BSc Seminar.....	13
6. 1-AIN-991/15	BSc Thesis Defense ( <b>state exam</b> ).....	15
7. 1-AIN-407/22	Brain and Mind.....	16
8. 1-AIN-408/22	Cognitive Laboratory.....	18
9. 1-INF-283/15	Computer Networks (1).....	19
10. 2-INF-183/15	Computer Networks (2).....	21
11. 1-AIN-140/22	Computer Principles - Hardware.....	23
12. 1-AIN-180/22	Computer Principles - Operating Systems.....	25
13. 1-AIN-186/22	Computer Principles - System Programming.....	27
14. 1-AIN-611/22	Creative Writing.....	29
15. 1-AIN-221/22	Databases (1).....	31
16. 1-AIN-131/22	Development of Information Systems.....	33
17. 1-AIN-121/22	Discrete Mathematics (1).....	35
18. 1-AIN-160/22	Discrete Mathematics (2).....	37
19. 1-AIN-105/22	Efficient Algorithms and Data Structures.....	39
20. 1-AIN-311/22	Embedded Linux.....	41
21. 1-MXX-233/13	English Conversation Course (1).....	42
22. 1-MXX-234/13	English Conversation Course (2).....	44
23. 1-MXX-131/00	English Language (1).....	46
24. 1-MXX-132/00	English Language (2).....	48
25. 1-MXX-231/00	English Language (3).....	50
26. 1-MXX-232/10	English Language (4).....	52
27. 1-AIN-670/22	Expert Systems.....	54
28. 2-AIN-133/15	Extreme Programming.....	56
29. 1-MXX-141/00	French Language (1).....	58
30. 1-MXX-142/00	French Language (2).....	59
31. 1-MXX-241/00	French Language (3).....	60
32. 1-MXX-242/00	French Language (4).....	61
33. 1-AIN-301/22	Fundamentals of Computer Graphics and Image Processing.....	62
34. 1-AIN-303/24	Game Engines.....	64
35. 1-AIN-307/24	Game Engines (2).....	66
36. 1-MXX-151/00	German Language (1).....	68
37. 1-MXX-152/00	German Language (2).....	69
38. 1-MXX-251/00	German Language (3).....	70
39. 1-MXX-252/00	German Language (4).....	71
40. 2-INF-174/15	Graph Theory.....	72
41. 1-AIN-413/22	Graphs, Graphic Algorithms and Optimization.....	74
42. 1-MXX-491/22	Inclusive Approaches to Education of Students with Special Educational Needs.....	76
43. 1-AIN-414/25	Information Systems in Public Administration.....	78
44. 1-AIN-317/23	Internet, AI & Society.....	80
45. 1-AIN-304/22	Introduction to Artificial Intelligence.....	82
46. 1-INF-520/00	Introduction to Information Security.....	84

47. 1-AIN-211/22	Introduction to Theoretical Informatics.....	86
48. 1-AIN-112/22	Introduction to Web Technologies.....	88
49. 1-AIN-545/22	Introduction to geometric modeling.....	90
50. 1-AIN-406/22	Language and Cognition.....	92
51. 1-AIN-152/22	Linear Algebra.....	94
52. 1-AIN-510/22	Linux - Principles and Means.....	96
53. 1-AIN-500/22	Linux for Users.....	98
54. 1-AIN-412/22	Logic for Computer Science.....	100
55. 1-AIN-306/22	Machine practicum _ learning and artificial intelligence on the visual data....	102
56. 1-AIN-188/22	Mathematical Analysis.....	104
57. 1-AIN-472/22	Mobile Application Developement.....	106
58. 1-MAT-570/15	Modelling and Rendering Techniques.....	108
59. 1-AIN-530/22	Multimedia.....	110
60. 2-AIN-286/22	Ontologies and Knowledge Engineering.....	112
61. 2-MXX-132/23	Participation in Empirical Research.....	114
62. 2-MXX-132/23	Participation in Empirical Research.....	115
63. 1-AIN-675/22	Philophy of Internet.....	116
64. 1-MXX-110/00	Physical Education and Sport (1).....	118
65. 1-MXX-120/22	Physical Education and Sport (2).....	120
66. 1-MXX-210/00	Physical Education and Sport (3).....	122
67. 1-MXX-220/00	Physical Education and Sport (4).....	123
68. 1-MXX-310/00	Physical Education and Sport (5).....	124
69. 1-MXX-320/22	Physical Education and Sport (6).....	125
70. 1-AIN-167/22	Practical Classes in Robotics.....	126
71. 1-AIN-319/24	Probability and Statistics for Informaticians.....	128
72. 1-AIN-130/22	Programming (1).....	130
73. 1-AIN-170/22	Programming (2).....	132
74. 1-AIN-171/22	Programming (3).....	134
75. 1-AIN-172/22	Programming (4).....	136
76. 1-AIN-302/22	Programming (5).....	138
77. 1-AIN-430/22	Programming Paradigms.....	140
78. 1-MXX-161/00	Russian Language (1).....	142
79. 1-MXX-162/00	Russian Language (2).....	143
80. 1-MXX-261/00	Russian Language (3).....	144
81. 1-MXX-262/00	Russian Language (4).....	145
82. 2-IKVa-192/19	Science, Technology and Humanity: Opportunities and Risks.....	146
83. 1-MXX-171/20	Slovak Language for Foreign Students (1).....	148
84. 1-MXX-172/20	Slovak Language for Foreign Students (2).....	149
85. 1-MXX-271/20	Slovak Language for Foreign Students (3).....	150
86. 1-MXX-272/20	Slovak Language for Foreign Students (4).....	151
87. 1-AIN-470/22	Specification and Verification of Programs.....	152
88. 1-MXX-115/15	Sports in Nature (1).....	154
89. 1-MXX-215/15	Sports in Nature (2).....	156
90. 1-MXX-216/18	Sports in Nature (3).....	158
91. 1-MXX-217/18	Sports in Nature (4).....	160
92. 1-MXX-133/18	Supplementary English Course (1).....	162
93. 1-MXX-134/18	Supplementary English Course (2).....	164
94. 1-AIN-316/22	Technologies of Digital Fabrication.....	166
95. 2-INF-176/15	Unix for System Administrators.....	168

96. 1-AIN-415/25	Values and Accountability in Computing and Artificial Intelligence.....	170
97. 1-AIN-189/22	Web Applications (1).....	172
98. 1-AIN-244/22	Web Applications (2).....	174
99. 1-AIN-168/22	Web Applications in Praxis.....	176
100. 1-AIN-318/23	XP: Clean code, refactorization, legacy code.....	177
101. 1-AIN-232/22	Year project and introduction to bachelor thesis.....	178

## COURSE DESCRIPTION

<b>Academic year:</b> 2025/2026	
<b>University:</b> Comenius University Bratislava	
<b>Faculty:</b> Faculty of Mathematics, Physics and Informatics	
<b>Course ID:</b> FMFI.KAI/1-AIN-245/22	<b>Course title:</b> 3D Technologies, Robotics and Artificial Intelligence
<b>Educational activities:</b> <b>Type of activities:</b> course <b>Number of hours:</b> <b>per week:</b> 3 <b>per level/semester:</b> 39 <b>Form of the course:</b> on-site learning	
<b>Number of credits:</b> 3	
<b>Recommended semester:</b> 5.	
<b>Educational level:</b> I.	
<b>Prerequisites:</b>	
<b>Course requirements:</b> During the exercises, the student must master the technologies taken over, through the implementation of a small project. At the end of the teaching part of the semester, the student must present his project implemented by modern technologies. For solved tasks, the student can get points in the continuous assessment. Indicative rating scale: A 90%, B 80%, C 70%, D 60%, E 50% Scale of assessment (preliminary/final): 100/0	
<b>Learning outcomes:</b> By completing the course the student will gain basic knowledge about current technologies of 3D imaging (Structured Light, Parallel structured light, Stereo vision, Photogrammetry, Time-of-Flight cameras) and storage of 3D data processing (depthmap, pointcloud). The potential of these technologies for intelligent robotics and artificial intelligence (object recognition, object capture) will be presented. Next, techniques that can be applied to the obtained data will be discussed: geometric algorithms, neural networks, convolutional neural networks, other machine learning algorithms. Possible applications for industry and the consumer area will also be presented. As an additional topic will be the presentation of basic knowledge in the business application of academic ideas (i.e. how to establish a technological start-up).	
<b>Class syllabus:</b> 1. 3D scanning technologies 2. Representation of 3D data and work with them 3. 3D data processing 4. Robotic Operating System as an abstraction interface for robotics, Gazebo as a simulation tool 5. Neural networks, framework caffe, other tools for rapid prototyping 6. Establishment of a startup, obtaining an investment, patent protection, business plan	
<b>Recommended literature:</b>	
<b>Languages necessary to complete the course:</b> Slovak, English	

<b>Notes:</b>					
<b>Past grade distribution</b>					
Total number of evaluated students: 12					
A	B	C	D	E	FX
100,0	0,0	0,0	0,0	0,0	0,0
<b>Lecturers:</b> RNDr. Michal Malý, PhD., Mgr. Ján Žižka, PhD., Mgr. Tomáš Kovačovský					
<b>Last change:</b> 24.06.2022					
<b>Approved by:</b> doc. RNDr. Damas Gruska, PhD.					

## STATE EXAM DESCRIPTION

<b>Academic year:</b> 2025/2026	
<b>University:</b> Comenius University Bratislava	
<b>Faculty:</b> Faculty of Mathematics, Physics and Informatics	
<b>Course ID:</b> FMFI.KAI/1-AIN-955/15	<b>Course title:</b> Applied Informatics
<b>Number of credits:</b> 4	
<b>Educational level:</b> I.	
<b>Course requirements:</b> Exam: State exam Indicative rating scale: A 90%, B 80%, C 70%, D 60%, E 50% Scale of assessment (preliminary/final): 0/100	
<b>Class syllabus:</b> The exam consists of material taught in compulsory subjects in the field of: discrete mathematics, mathematical analysis, algebra and logic, programming, databases, web applications, computer principles - (hardware, system programming, operating systems, computer networks) and the creation of information systems. A more detailed and updated content of the questions will be published in advance in each academic year through the academic information system. As a rule, specific issues in state studies will integrate several areas related to the topic of a specific bachelor's thesis.	
<b>State exam syllabus:</b> 1. M. Základné kombinatorické konfigurácie. Binomické koeficienty. Princíp zapojenia a vypojenia. P. Prefixové stromy. Kompresia textov a Huffmanovo kódovanie. Porovnanie implementácií v rôznych jazykoch. A. Správa pamäti: jednoduchá správa pamäti, virtuálna pamäť, stránkovanie, segmentovanie. Algoritmy výmeny stránok. 2. M. Typy dôkazov. Priamy a nepriamy dôkaz. Dôkaz sporom. (Ilustrovat na základnej teorii čísel. Deliteľnosť, prvociselnosť, atď. ) Matematická indukcia. P. Rozdeľuj a panuj triediace algoritmy. Využitie rekurzcie, možné problémy s rekúziou v rôznych jazykoch. Vlastnosti algoritmu merge-sort zdola nahor. A. Bezpečnosť sietí – bezpečnostné problémy a mechanizmy na rôznych vrstvách – VLAN. 3. M. Diskrétna pravdepodobnosť. Experiment a náhodný jav. Bernoulliho schéma. Podmienená pravdepodobnosť. Bayesova veta. P. Efektívne realizácie dátových štruktúr Set a Multiset. Porovnanie implementácií v rôznych jazykoch. A. Navrhovanie databáz: relačný model dát, entitno relačný model dát, kardinalita vzťahov, roly entít, n-árne vzťahy, transformovanie entitno relačného modelu na relačný, reprezentovanie podmnožín, kontextualizácia dát, reifikovanie, meta modelovanie, typy a ich explicitné uchovávanie. 4. M. Relácie na množine. Relácia ekvivalencie a rozklady množín. Čiastočne usporiadané množiny. P. Ošetrovanie chýb, assert, výnimky, testy, rozdiely v rôznych jazykoch.	

A. Modelovanie a návrh: entitno-relačný diagram, diagram dátových tokov, UML diagramy: use-case, stavový, activity, sekvenčný, komponentný, triedny, deployment. Študent vie nakresliť príklad každého diagramu a vysvetliť ho.

5.

M. Injektívne, surjektívne a bijektívne zobrazenia. Spočítateľné a nespočítateľné množiny. Cantorova diagonalizačná metóda.

P. Efektívne reprezentácie dátovej štruktúry graf. Využitie problému Union-find pri hľadaní kostry grafu.

A. Sieťová architektúra, vrstvomové modely, služby – vrstva, rozhranie, protokol, fyzický a logický tok údajov. Kľúčové problémy pri návrhu sietí.

6.

M. Limita a spojitosť funkcií jednej reálnej premennej.

P. Efektívne realizácie dátovej štruktúry asociatívneho poľa. Riešenie kolízií. Implementácie asociatívneho poľa v rôznych jazykoch.

A. Správa zariadení a správa súborov: radič, spôsoby prenosu údajov medzi radičom a pamäťou. software správy zariadení. Pojem súbor a adresár, druhy súborov, spôsoby kódovania znakov v textových súboroch.

7.

M. Derivácia funkcií jednej reálnej premennej a jej využitie pri vyšetrovaní priebehu funkcií.

P. Efektívna realizácia operácií prioritného frontu PriorityQueue. Porovnanie implementácií v rôznych jazykoch.

A. Operačný systém pri pohľade zvonku (služby, ich význam z pohľadu vyšších vrstiev vrstvomového modelu počítača) a zvnútra (správa procesov, správa pamäti, správa zariadení a správa súborov). Hlavné úlohy jednotlivých správ.

8.

M. Primitívna funkcia a metódy jej výpočtu.

P. Algoritmy prechádzania stromových dátových štruktúr. Možnosti realizácie pomocou lazy algoritmov v rôznych jazykoch.

A. Organizácia počítačových systémov - vrstvomový model počítača, súvislosti medzi vrstvami. Procesor (mikroprocesor, ALU, realizácia inštrukcií), vnútorná a vonkajšia pamäť, prídavné zariadenia, zbernica z hľadiska hardvéru aj softvéru.

9.

M. Logika prvého rádu: Syntax (symboly, termy, formuly) a sémantika (štruktúra, hodnota termu, splnenie formuly a teórie). Vyplývanie, nezávislosť, nesplniteľnosť a ich vzťah.

P. Stromové dátové štruktúry. Rozdiely v implementácii pomocou dynamických dátových štruktúr v rôznych jazykoch.

A. Počítačové systémy: Základné logické funkcie a ich realizácia. Boolovské funkcie. Niektoré kombinačné obvody (sčítačka, multiplexor a demultiplexor).

10.

M. Deterministický konečný automat (definícia, konfigurácia, krok výpočtu, výpočet, jazyk, ktorý akceptuje).

P. Spôsoby prehľadávania stavového priestoru, do hĺbky a do šírky, Dijkstrov algoritmus. Porovnanie implementácií v rôznych jazykoch.

A. Klientské vs. serverové webové aplikácie, princíp fungovania, vysvetlenie sieťovej komunikácie a jej spracovania.

11:

M. Nedeterministický konečný automat (definícia, konfigurácia, krok výpočtu, výpočet, jazyk, ktorý akceptuje).

P. Asymptotická výpočtová zložitosť, notácia veľké O, amortizovaná zložitosť.

<p>A. Synchronizácia procesov a vlákien – zdieľanie údajov, časová závislosť, vzájomné vylúčenie, kritická sekcia, deadlock, busy waiting.</p> <p>12.</p> <p>M. Turingov stroj, porovnanie s konečným automatom. Existuje jazyk, ktorý sa nedá rozpoznať žiadnym TS?</p> <p>P. Lineárne dátové štruktúry (zoznam, front, zásobník), efektívna implementácia pomocou dynamických dátových štruktúr. Rozdiely v implementácii v rôznych jazykoch.</p> <p>A. Webové aplikácie na strane servera, primárne jazyk PHP (alt. Python, Ruby,...), prepojenie PHP (alt. Python, Ruby,...) s databázou, spracovanie a ošetrovanie dát od používateľa, prenos dát medzi stránkami.</p> <p>13.</p> <p>M. Tablový alebo rezolvenčný kalkul: Pravidlá kalkulu pre logiku prvého rádu. Vyslovte vetu o korektnosti a úplnosti, vysvetlite jej vzťah k vyplývaniu.</p> <p>P. Úloha abstraktného dátového typu, rozdiely v implementácii v rôznych jazykoch.</p> <p>A. Web: základná štruktúra dokumentu, metadáta, sekcie a nadpisy, zgrupovanie a elementy s text-level sémantikou, formuláre. Vlastnosti CSS, ich hodnoty, selektory, box model, statické, relatívne, absolútne a fixné polohovanie, media queries.</p>
<p><b>Languages necessary to complete the course:</b></p> <p>Slovak, English</p>
<p><b>Last change:</b> 29.06.2022</p>
<p><b>Approved by:</b> doc. RNDr. Damas Gruska, PhD.</p>



## COURSE DESCRIPTION

<b>Academic year:</b> 2025/2026	
<b>University:</b> Comenius University Bratislava	
<b>Faculty:</b> Faculty of Mathematics, Physics and Informatics	
<b>Course ID:</b> FMFI.KAI/1-AIN-426/22	<b>Course title:</b> Applied Robotics Seminar (1)
<b>Educational activities:</b> <b>Type of activities:</b> course <b>Number of hours:</b> <b>per week:</b> 1 <b>per level/semester:</b> 13 <b>Form of the course:</b> on-site learning	
<b>Number of credits:</b> 1	
<b>Recommended semester:</b> 3.	
<b>Educational level:</b> I.	
<b>Prerequisites:</b>	
<b>Course requirements:</b> During semester: active participation at seminars and/or events Grading: A 90%, B 80%, C 70%, D 60%, E 50% Scale of assessment (preliminary/final): 100/0	
<b>Learning outcomes:</b> The course has an irregular schedule and it is typically organized as a set of practical hands-on workshops with the duration of 3-5 hours, where the students learn about various robotic platforms in a playful way, learn about the basics of control and programming of robots, processing signals from sensors at various levels of abstraction. Student will be able to build, program and run his or her own robotic product and use 3D printing for that end. He or she will have verified the knowledge in practical situations.	
<b>Class syllabus:</b> - hands-on workshops with LEGO Spike Prime - robotic sets as educational tool - sensors and actuators - simple navigation, simulation, learning - analysis of robot behavior - practical building and programming of robot models - elementary electronics for Arduino robots - practical workshops with Arduino - practical workshops with other robotic platforms – Jupiter, Nico, Mikeš - robotic contests	
<b>Recommended literature:</b> Petrovic P. (2020) Spike up Prime Interest in Physics, Robotics in Education 2020. Alan G. Smith: Introduction to Arduino. A piece of cake! IntroToArduino.com, 2011.	
<b>Languages necessary to complete the course:</b> Slovak or English	

**Notes:**

This course can be taken in either of the two semesters, but counts only one time. We welcome students of all study years from the whole university.

**Past grade distribution**

Total number of evaluated students: 229

A	B	C	D	E	FX
98,25	0,44	0,44	0,0	0,0	0,87

**Lecturers:** Mgr. Pavel Petrovič, PhD.

**Last change:** 15.06.2022

**Approved by:** doc. RNDr. Damas Gruska, PhD.

## COURSE DESCRIPTION

<b>Academic year:</b> 2025/2026	
<b>University:</b> Comenius University Bratislava	
<b>Faculty:</b> Faculty of Mathematics, Physics and Informatics	
<b>Course ID:</b> FMFI.KAI/1-AIN-427/22	<b>Course title:</b> Applied Robotics Seminar (2)
<b>Educational activities:</b> <b>Type of activities:</b> course <b>Number of hours:</b> <b>per week: 1 per level/semester: 13</b> <b>Form of the course:</b> on-site learning	
<b>Number of credits:</b> 1	
<b>Recommended semester:</b> 4.	
<b>Educational level:</b> I.	
<b>Prerequisites:</b>	
<b>Course requirements:</b> During semester: active participation at seminars and/or events Grading: A 90%, B 80%, C 70%, D 60%, E 50% Scale of assessment (preliminary/final): 100/0	
<b>Learning outcomes:</b> The course has an irregular schedule and it is typically organized as a set of practical hands-on workshops with the duration of 3-5 hours, where the students learn about various robotic platforms in a playful way, learn about the basics of control and programming of robots, processing signals from sensors at various levels of abstraction. Student will be able to build, program and run his or her own robotic product and use 3D printing for that end. He or she will have verified the knowledge in practical situations.	
<b>Class syllabus:</b> - hands-on workshops with LEGO Spike Prime - robotic sets as educational tool - sensors and actuators - simple navigation, simulation, learning - analysis of robot behavior - practical building and programming of robot models - elementary electronics for Arduino robots - practical workshops with Arduino - practical workshops with other robotic platforms – Jupiter, Nico, Mikeš - robotic contests	
<b>Recommended literature:</b> Petrovic P. (2020) Spike up Prime Interest in Physics, Robotics in Education 2020. Alan G. Smith: Introduction to Arduino. A piece of cake! IntroToArduino.com, 2011.	
<b>Languages necessary to complete the course:</b> Slovak or English	

**Notes:**

This course can be taken in either of the two semesters, but counts only one time. We welcome students of all study years from the whole university.

**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:** Mgr. Pavel Petrovič, PhD.

**Last change:** 15.06.2022

**Approved by:** doc. RNDr. Damas Gruska, PhD.

## COURSE DESCRIPTION

<b>Academic year:</b> 2025/2026					
<b>University:</b> Comenius University Bratislava					
<b>Faculty:</b> Faculty of Mathematics, Physics and Informatics					
<b>Course ID:</b> FMFI.KAI/1-AIN-920/22		<b>Course title:</b> BSc Seminar			
<b>Educational activities:</b> <b>Type of activities:</b> seminar <b>Number of hours:</b> <b>per week:</b> 1 <b>per level/semester:</b> 13 <b>Form of the course:</b> on-site learning					
<b>Number of credits:</b> 1					
<b>Recommended semester:</b> 6.					
<b>Educational level:</b> I.					
<b>Prerequisites:</b>					
<b>Course requirements:</b> During semester: priebežné referáty Final grade depends on presentation of the final thesis results Evaluation scale: A 90%, B 80%, C 70%, D 60%, E 50% Scale of assessment (preliminary/final): 100/0					
<b>Learning outcomes:</b> Students will get acquainted with research work and with writing scientific publications. They will discuss about project approach to problem solving, and they will be introduced to the basics of acquiring and presenting research results.					
<b>Class syllabus:</b> - student in cooperation with the advisor of bachelor thesis and with the teacher of the seminar formulates goals and stages of his or her work, - principles of research and scientific work, evaluation and presentation, - principles of producing scientific publications, - regular presentation of interim results of the bachelor thesis in a seminar study group					
<b>Recommended literature:</b> depending on the topic of the bachelor thesis, and recommendation of the thesis advisor information sources on the Internet					
<b>Languages necessary to complete the course:</b> Slovak, English					
<b>Notes:</b>					
<b>Past grade distribution</b> Total number of evaluated students: 1089					
A	B	C	D	E	FX
70,52	11,85	7,35	1,84	2,57	5,88

<b>Lecturers:</b> Mgr. Pavel Petrovič, PhD., RNDr. Andrej Blaho, PhD., doc. RNDr. Zuzana Černeková, PhD., doc. RNDr. Damas Gruska, PhD.
---

<b>Last change:</b> 07.04.2022
--------------------------------

<b>Approved by:</b> doc. RNDr. Damas Gruska, PhD.
---

## STATE EXAM DESCRIPTION

<b>Academic year:</b> 2025/2026	
<b>University:</b> Comenius University Bratislava	
<b>Faculty:</b> Faculty of Mathematics, Physics and Informatics	
<b>Course ID:</b> FMFI.KAI/1-AIN-991/15	<b>Course title:</b> BSc Thesis Defense
<b>Number of credits:</b> 8	
<b>Educational level:</b> I.	
<b>State exam syllabus:</b>	
<b>Last change:</b> 22.09.2017	
<b>Approved by:</b> doc. RNDr. Damas Gruska, PhD.	

## COURSE DESCRIPTION

<b>Academic year:</b> 2025/2026	
<b>University:</b> Comenius University Bratislava	
<b>Faculty:</b> Faculty of Mathematics, Physics and Informatics	
<b>Course ID:</b> FMFI.KAI/1-AIN-407/22	<b>Course title:</b> Brain and Mind
<b>Educational activities:</b> <b>Type of activities:</b> course <b>Number of hours:</b> <b>per week: 2 per level/semester: 26</b> <b>Form of the course:</b> on-site learning	
<b>Number of credits:</b> 3	
<b>Recommended semester:</b> 1., 3., 5.	
<b>Educational level:</b> I., I.II.	
<b>Prerequisites:</b>	
<b>Course requirements:</b> 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	
<b>Learning outcomes:</b> The course objectives are to make the students familiar with major theories and methods of mind/brain research.	
<b>Class syllabus:</b> 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.	
<b>Recommended literature:</b> S. Blackmore, E.T. Troscianko: Consciousness. 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.	
<b>Languages necessary to complete the course:</b> Slovak, English	
<b>Notes:</b>	



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

## COURSE DESCRIPTION

<b>Academic year:</b> 2025/2026					
<b>University:</b> Comenius University Bratislava					
<b>Faculty:</b> Faculty of Mathematics, Physics and Informatics					
<b>Course ID:</b> FMFI.KAI/1-AIN-408/22		<b>Course title:</b> Cognitive Laboratory			
<b>Educational activities:</b> <b>Type of activities:</b> course <b>Number of hours:</b> <b>per week: 2 per level/semester: 26</b> <b>Form of the course:</b> on-site learning					
<b>Number of credits:</b> 2					
<b>Recommended semester:</b> 1., 3., 5.					
<b>Educational level:</b> I., I.II.					
<b>Prerequisites:</b>					
<b>Course requirements:</b> Interim evaluation: presentations Indicative assessment scale: A 90%, B 80%, C 70%, D 60%, E 50% Scale of assessment (preliminary/final): 100/0					
<b>Learning outcomes:</b> Acquisition of methods for studying various cognitive phenomena (data collection and analysis) using an online cognitive laboratory.					
<b>Class syllabus:</b> 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.					
<b>Recommended literature:</b> CogLab / Greg Francis, Ian Neath, Daniel R. VanHorn. Thomson/Wadsworth, 2014					
<b>Languages necessary to complete the course:</b> Slovak, English					
<b>Notes:</b>					
<b>Past grade distribution</b> Total number of evaluated students: 94					
A	B	C	D	E	FX
64,89	12,77	9,57	1,06	0,0	11,7
<b>Lecturers:</b> doc. PhDr. Ján Rybár, PhD.					
<b>Last change:</b> 17.05.2024					
<b>Approved by:</b> doc. RNDr. Damas Gruska, PhD.					

## COURSE DESCRIPTION

<b>Academic year:</b> 2025/2026	
<b>University:</b> Comenius University Bratislava	
<b>Faculty:</b> Faculty of Mathematics, Physics and Informatics	
<b>Course ID:</b> FMFI.KI/1-INF-283/15	<b>Course title:</b> Computer Networks (1)
<b>Educational activities:</b> <b>Type of activities:</b> lecture / practicals <b>Number of hours:</b> <b>per week:</b> 2 / 1 <b>per level/semester:</b> 26 / 13 <b>Form of the course:</b> on-site learning	
<b>Number of credits:</b> 4	
<b>Recommended semester:</b> 2.	
<b>Educational level:</b> I.	
<b>Prerequisites:</b>	
<b>Antirequisites:</b> FMFI.KI/1-INF-260/00	
<b>Course requirements:</b> During semester: Exercises - practical assignments (50%), mid-term test (50%) Final exam: written test (at least 50% required) and oral final exam (may be waived) Approximate grading scale: A 90%, B 80%, C 70%, D 60%, E 50% Scale of assessment (preliminary/final): 40/60	
<b>Learning outcomes:</b> Students will be familiar with basic terminology of computer networks and principles of their operation. They will have practical experience with usage and configuration of technologies commonly used on local networks and on the internet.	
<b>Class syllabus:</b> Basic network terminology, layer models, OSI, TCP/IP Physical layer - cables, wireless transmission Data link layer - Ethernet, WiFi. Network layer – IP, routing, ICMP, ARP. Transport layer – UDP, TCP, NAT. Application layer – DNS, DHCP, Web, Mail, FTP, ... IPv6 Security – firewall, VPN, SSL/TLS, security at the application layer (Web, Mail).	
<b>Recommended literature:</b> Computer Networks / Andrew S. Tanenbaum, David J. Wetherall. Boston : Pearson education, 2011 Computer Networks / Andrew S. Tanenbaum. Upper Saddle River : Prentice-Hall, 2003 Data and computer communications / William Stallings. Upper Saddle River : Prentice-Hall, 2004	
<b>Languages necessary to complete the course:</b> Slovak, English	

<b>Notes:</b>					
<b>Past grade distribution</b>					
Total number of evaluated students: 2177					
A	B	C	D	E	FX
13,55	15,11	18,51	24,76	17,91	10,15
<b>Lecturers:</b> RNDr. Jaroslav Janáček, PhD., Ing. Dušan Bernát, PhD., doc. RNDr. Daniel Olejár, PhD.					
<b>Last change:</b> 22.06.2022					
<b>Approved by:</b> doc. RNDr. Damas Gruska, PhD.					

## COURSE DESCRIPTION

<b>Academic year:</b> 2025/2026	
<b>University:</b> Comenius University Bratislava	
<b>Faculty:</b> Faculty of Mathematics, Physics and Informatics	
<b>Course ID:</b> FMFI.KI/2-INF-183/15	<b>Course title:</b> Computer Networks (2)
<b>Educational activities:</b> <b>Type of activities:</b> lecture / practicals <b>Number of hours:</b> <b>per week:</b> 2 / 1 <b>per level/semester:</b> 26 / 13 <b>Form of the course:</b> on-site learning	
<b>Number of credits:</b> 4	
<b>Recommended semester:</b> 5.	
<b>Educational level:</b> I., II.	
<b>Prerequisites:</b>	
<b>Recommended prerequisites:</b> 1-INF-283	
<b>Course requirements:</b> practical assignments during semester, written final test (at least 50% required) and oral final exam (may be waived) Approximate grading scale: A 90%, B 80%, C 70%, D 60%, E 50% Scale of assessment (preliminary/final): 40/60	
<b>Learning outcomes:</b> Students will be familiar with principles and practical application of advanced technologies in computer networks and data communication.	
<b>Class syllabus:</b> 802.1q, STP, DOCSIS , IP routing protocols (BGP, OSPF), advanced topics in TCP (syn-cookies, ECN, ...). Theoretical principles of data transmission, maximal bandwidth, CRC, modulation techniques, multiplexing, FDMA, TDMA, CDMA, synchronous and asynchronous links, PPP.	
<b>Recommended literature:</b> Computer Networks / Andrew S. Tanenbaum, David J. Wetherall. Boston : Pearson education, 2011 Computer Networks / Andrew S. Tanenbaum. Upper Saddle River : Prentice-Hall, 2003 Data and computer communications / William Stallings. Upper Saddle River : Prentice-Hall, 2004	
<b>Languages necessary to complete the course:</b> Slovak, English	
<b>Notes:</b>	

<b>Past grade distribution</b>					
Total number of evaluated students: 167					
A	B	C	D	E	FX
27,54	35,33	25,15	8,38	2,4	1,2
<b>Lecturers:</b> RNDr. Jaroslav Janáček, PhD., doc. RNDr. Daniel Olejár, PhD.					
<b>Last change:</b> 22.06.2022					
<b>Approved by:</b> doc. RNDr. Damas Gruska, PhD.					

## COURSE DESCRIPTION

<b>Academic year:</b> 2025/2026	
<b>University:</b> Comenius University Bratislava	
<b>Faculty:</b> Faculty of Mathematics, Physics and Informatics	
<b>Course ID:</b> FMFI.KEF/1-AIN-140/22	<b>Course title:</b> Computer Principles - Hardware
<b>Educational activities:</b> <b>Type of activities:</b> course <b>Number of hours:</b> <b>per week: 5 per level/semester: 65</b> <b>Form of the course:</b> on-site learning	
<b>Number of credits:</b> 7	
<b>Recommended semester:</b> 1.	
<b>Educational level:</b> I.	
<b>Prerequisites:</b>	
<b>Antirequisites:</b> FMFI.KEF/1-AIN-140/15	
<b>Course requirements:</b> Continuing evaluation: tests At least 50% aggregate score from tests is required for the admission to the exam. Exam: exam Indicative grading scheme: A 90%, B 80%, C 72%, D 65%, E 60% Supplementary classification in case of repair test - oral exam is possible. Scale of assessment (preliminary/final): 70/30	
<b>Learning outcomes:</b> Students acquire essential knowledge of principles and properties of basic digital circuits. Gain practical experience to design and construct digital electronic devices and programing selected microprocessors and simple robotic systems.	
<b>Class syllabus:</b> Principles of circuits DDL, DTL and TTL Boolean functions - combinatorial logical networks and their optimization Selected combinatorial curcuits (adder, multiplexer, demultiplexer) Physical implementation of automata (sequential circuits and their applications) RS and D flip-flops, counter, shift register, three-state output, memory control R/W, parallel code converter, RS232 interface, static and dynamic RAMs and their organization Microprocessors Microprocessor structure Arithmetic-logic unit (ALU) structure Implementation of instructions and their classification Addressing methods, internal and external memory Auxiliary devices, their connection and data transfer, bus Implementation of coupling circuits for memory and peripherals Characteristics affecting computer performance, clock fequency, access time, transmission capacity, register size	

Programming of single-chip microcomputers in higher and low-level programming language  
Fundamentals of robotics, types of signals, their processing and control

**Recommended literature:**

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

**Languages necessary to complete the course:**

Slovak, English

**Notes:**

**Past grade distribution**

Total number of evaluated students: 884

A	B	C	D	E	FX
19,91	23,53	16,18	11,65	12,78	15,95

**Lecturers:** RNDr. Ján Greguš, PhD., Mgr. Pavel Petrovič, PhD., doc. Ing. Maroš Gregor, PhD.

**Last change:** 27.06.2022

**Approved by:** doc. RNDr. Damas Gruska, PhD.



## COURSE DESCRIPTION

<b>Academic year:</b> 2025/2026	
<b>University:</b> Comenius University Bratislava	
<b>Faculty:</b> Faculty of Mathematics, Physics and Informatics	
<b>Course ID:</b> FMFI.KDMFI/1-AIN-180/22	<b>Course title:</b> Computer Principles - Operating Systems
<b>Educational activities:</b> <b>Type of activities:</b> course <b>Number of hours:</b> <b>per week: 3 per level/semester: 39</b> <b>Form of the course:</b> on-site learning	
<b>Number of credits:</b> 4	
<b>Recommended semester:</b> 4.	
<b>Educational level:</b> I.	
<b>Prerequisites:</b>	
<b>Antirequisites:</b> FMFI.KDMFI/1-AIN-180/15	
<b>Course requirements:</b> Students read in advance selected chapters from the textbook (Remzi & Arpaci-Dusseau). In the classroom, students fill-out a quiz in order to verify completion of this task. In addition, they solve practical tasks related to the topic. Students can complete the tasks at home. To qualify for a final credit, students need to correctly answer 70% of quiz questions, and solve 70% of practical tasks. The grade is calculated proportionally to the score achieved. Scale of assessment (preliminary/final): 100/0 during semester, with the possibility of exam in case of lack of points	
<b>Learning outcomes:</b> Students will be able to use typical services of operating systems in their C programs. They will understand concepts from the theory and practice of operating systems: memory management, process and thread synchronization, input/output devices and file systems, user maintenance, and internal principles of modern operating systems. They will be able to apply the knowledge in operating systems administration and application development.	
<b>Class syllabus:</b> Address spaces, segmentation and paging, swapping, multithreaded and parallel programs, synchronization mechanisms: mutexes, semaphores, condition variables, input/output devices, organization of hard drives and ssd, file systems, journaling, data integrity and security, user maintenance.	
<b>Recommended literature:</b> Remzi H. Arpaci-Dusseau, Andrea C. Arpaci-Dusseau and Peter Reiher: Operating Systems: Three Easy Pieces, Arpaci-Dusseau Books, August, 2018. Andrew S. Tanenbaum and Herbert Bos: Modern Operating Systems, Fourth Edition, Pearson, 2014.	
<b>Languages necessary to complete the course:</b> Slovak, English	

<b>Notes:</b>					
<b>Past grade distribution</b> Total number of evaluated students: 360					
A	B	C	D	E	FX
15,83	16,94	17,5	20,0	15,28	14,44
<b>Lecturers:</b> Mgr. Pavel Petrovič, PhD., RNDr. Jozef Šiška, PhD., doc. RNDr. Martin Homola, PhD.					
<b>Last change:</b> 07.04.2022					
<b>Approved by:</b> doc. RNDr. Damas Gruska, PhD.					

## COURSE DESCRIPTION

<b>Academic year:</b> 2025/2026	
<b>University:</b> Comenius University Bratislava	
<b>Faculty:</b> Faculty of Mathematics, Physics and Informatics	
<b>Course ID:</b> FMFI.KAI/1-AIN-186/22	<b>Course title:</b> Computer Principles - System Programming
<b>Educational activities:</b> <b>Type of activities:</b> course <b>Number of hours:</b> <b>per week: 3 per level/semester: 39</b> <b>Form of the course:</b> on-site learning	
<b>Number of credits:</b> 4	
<b>Recommended semester:</b> 3.	
<b>Educational level:</b> I.	
<b>Prerequisites:</b> (FMFI.KEF/1-AIN-140/22 - Computer Principles - Hardware or FMFI.KEF/1-AIN-140/16 - Computer Principles - Hardware or FMFI.KI/1-INF-130/00 - Computer Architecture) and (FMFI.KAI+KDMFI/1-AIN-130/22 - Programming (1) or FMFI.KAI/1-AIN-105/22 - Efficient Algorithms and Data Structures or FMFI.KAI/1-AIN-130/16 - Programming (1))	
<b>Course requirements:</b> Students solve practical exercises in the lessons, where they need at least 70% to pass, and they also fill-in a quiz to verify they have learned the theoretical material, where they similarly also need to get 70% of points. For the struggling students, there is a possibility to earn extra bonus points for extra work. In the second (shorter) part, students read in advance given chapters from the textbook Remzi & Arpaci-Dusseau, but the evaluation is the same in both parts. Scale of assessment (preliminary/final): 100/0	
<b>Learning outcomes:</b> After completing this course, students will understand the principles of computer architecture at the level of machine code, they will be able to write simple programs in assembly language. They will be able to use typical operating system services in their C programs. Students will understand the concepts from the theory of operating systems> process management and scheduler, they will understand internal principles of how modern operating systems work. They will be able to apply the acquired skills in administration of operating systems and while developing applications.	
<b>Class syllabus:</b> Layered computer model, computer systems organization, representations of numbers in computers, bit operators, machine code level - specific example Intel® Pentium®, practical programming in assembly, compilation and linking, modules, selected services of operating systems from the point of view of application developer and their practical usage. Process management and scheduler.	
<b>Recommended literature:</b> Mikroprocesory Intel Pentium a spol. / Michal Brandejs, available at <a href="http://www.fi.muni.cz/usr/brandejs/Brandejs_Mikroprocesory_Intel_Pentium_2010.pdf">http://www.fi.muni.cz/usr/brandejs/Brandejs_Mikroprocesory_Intel_Pentium_2010.pdf</a> Remzi H. Arpaci-Dusseau and Andrea C. Arpaci-Dusseau: Operating Systems: Three Easy Pieces, CreateSpace Independent Publishing Platform, 2018.	

Andrew S. Tanenbaum and Herbert Bos: Modern Operating Systems, Fourth Edition, Pearson, 2014.					
<b>Languages necessary to complete the course:</b>					
<b>Notes:</b>					
<b>Past grade distribution</b> Total number of evaluated students: 317					
A	B	C	D	E	FX
11,99	12,62	15,14	22,4	22,08	15,77
<b>Lecturers:</b> Mgr. Pavel Petrovič, PhD., RNDr. Jozef Šiška, PhD., doc. RNDr. Martin Homola, PhD.					
<b>Last change:</b> 02.10.2024					
<b>Approved by:</b> doc. RNDr. Damas Gruska, PhD.					

## COURSE DESCRIPTION

<b>Academic year:</b> 2025/2026					
<b>University:</b> Comenius University Bratislava					
<b>Faculty:</b> Faculty of Mathematics, Physics and Informatics					
<b>Course ID:</b> FMFI.KAI/1-AIN-611/22		<b>Course title:</b> Creative Writing			
<b>Educational activities:</b> <b>Type of activities:</b> seminar <b>Number of hours:</b> <b>per week:</b> 2 <b>per level/semester:</b> 26 <b>Form of the course:</b> on-site learning					
<b>Number of credits:</b> 3					
<b>Recommended semester:</b> 6.					
<b>Educational level:</b> I.					
<b>Prerequisites:</b>					
<b>Course requirements:</b> Continuing evaluation: homework assignments (100%) Final grade: A 90%, B 80%, C 70%, D 60%, E 50%					
<b>Learning outcomes:</b>					
<b>Class syllabus:</b> Principles of creative writing Techniques of writing Writing Research Papers Journalistic genres Specifics of internet writing Art of editing Creativity, originality and rules					
<b>Recommended literature:</b> Lester, James D., Lester, James D. Jr., Principles of Writing Research Papers, Penguin Academics, 2003 Dočekalová, Markéta, Creative writing for all (in czech), Grada Publishing, 2006 Seley, Hans, Secrets fo science (in czech), Orbis Praha, 1964 King, Stephen, About writing, Memoirs about writing (in czech), BETA- Dobrovský, Praha, 2002 Bradbury, Ray, ZEN and Art of Writing, Essays about creativity (in czech), PRAGMA, Praha, 1998					
<b>Languages necessary to complete the course:</b>					
<b>Notes:</b>					
<b>Past grade distribution</b> Total number of evaluated students: 165					
A	B	C	D	E	FX
89,7	2,42	0,61	1,82	2,42	3,03

<b>Lecturers:</b> Ing. František Gyarfaš, CSc.
<b>Last change:</b> 24.06.2022
<b>Approved by:</b> doc. RNDr. Damas Gruska, PhD.

## COURSE DESCRIPTION

<b>Academic year:</b> 2025/2026	
<b>University:</b> Comenius University Bratislava	
<b>Faculty:</b> Faculty of Mathematics, Physics and Informatics	
<b>Course ID:</b> FMFI.KAI/1-AIN-221/22	<b>Course title:</b> Databases (1)
<b>Educational activities:</b> <b>Type of activities:</b> lecture / practicals <b>Number of hours:</b> <b>per week:</b> 2 / 2 <b>per level/semester:</b> 26 / 26 <b>Form of the course:</b> on-site learning	
<b>Number of credits:</b> 5	
<b>Recommended semester:</b> 3.	
<b>Educational level:</b> I.	
<b>Prerequisites:</b>	
<b>Course requirements:</b> - preparation and submission of all mandatory assignments and projects - obtaining min. 20 points from: - continuous tests (15% / points of the final grade), from which the student must obtain at least 6 points - project (30% / points of the final grade) - final test 55% / points of the final mark Indicative rating scale: A 90%, B 80%, C 70%, D 60%, E 50% Scale of assessment (preliminary/final): 45/55	
<b>Learning outcomes:</b> The student will gain theoretical and practical knowledge of data modeling and database technologies, can design and implement a program that uses persistence relational database data.	
<b>Class syllabus:</b> 1. Introduction, motivation and basic concepts of database systems 2. Data modeling - conceptual level, E-R model 3. Relational model, transformation of conceptual model into schema in relational database 4. SQL language - DDL, DML, Relational algebra 5. SQL language - SELECT, JOIN 6. SQL language - Aggregations, CTE 7. SQL language - Constraints, Triggers 8. SQL language - Window Functions 9. Database connectors, O / R mapping, architectural patterns of data sources 10. Normalization of data models 11. Indices, demand optimization 12. ACID, Transactions, Parallelism	
<b>Recommended literature:</b> Date, C: An Introduction to Database Systems, Pearson; 8th edition, 2004.	

- Garcia-Molina, H, Ullman J.D., Wisdom, J.: Database Systems: The Complete Book, Prentice-Hall, 2002 - Winand, M.: SQL Performance Explained, 2012.					
<b>Languages necessary to complete the course:</b> Slovak, English					
<b>Notes:</b>					
<b>Past grade distribution</b> Total number of evaluated students: 766					
A	B	C	D	E	FX
4,18	11,23	16,45	23,76	20,89	23,5
<b>Lecturers:</b> doc. RNDr. Martin Homola, PhD., Ing. Michal Barla, PhD., Ing. Alexander Šimko, PhD., Mgr. Iveta Bečková, PhD.					
<b>Last change:</b> 26.06.2022					
<b>Approved by:</b> doc. RNDr. Damas Gruska, PhD.					



## COURSE DESCRIPTION

<b>Academic year:</b> 2025/2026	
<b>University:</b> Comenius University Bratislava	
<b>Faculty:</b> Faculty of Mathematics, Physics and Informatics	
<b>Course ID:</b> FMFI.KAI+KDMFI/1-AIN-131/22	<b>Course title:</b> Development of Information Systems
<b>Educational activities:</b> <b>Type of activities:</b> course <b>Number of hours:</b> <b>per week:</b> 5 <b>per level/semester:</b> 65 <b>Form of the course:</b> on-site learning	
<b>Number of credits:</b> 7	
<b>Recommended semester:</b> 5.	
<b>Educational level:</b> I.	
<b>Prerequisites:</b>	
<b>Antirequisites:</b> FMFI.KI/1-INF-516/10	
<b>Course requirements:</b> Evaluation during semester: tests, midterm, active participation on team meetings Exam: practical form - video presentation about the realized project Approximate grading: A 90%, B 82%, C 73%, D 64%, E 55% Scale of assessment (preliminary/final): 50/50	
<b>Learning outcomes:</b> Students will know in detail phases and models of information systems development including agile methods, clean code principles, they will be able to read and draw basic UML diagrams, use design patterns, understand and use software version control systems and they will have experienced a complete information system development from requirements specification till deployment team project with combined model of development, while they will have acquired the skills and experiences of team cooperation and communication. They will also be acquainted with elementary principles of and social and ethical aspects of information technology and learn about running a business and launching startups.	
<b>Class syllabus:</b> <ul style="list-style-type: none"> <li>- Stages in development of information system</li> <li>- Traditional development models</li> <li>- Agile methods of IS development</li> <li>- Specification of requirements of IS</li> <li>- UML</li> <li>- Design of IS</li> <li>- Design patterns</li> <li>- Integration of applications</li> <li>- Source code repositories</li> <li>- Clean code</li> <li>- Soft skills</li> </ul>	

- Social and ethical aspects of information technology
- Introduction to running business and launching startups

**Recommended literature:**

Design patterns : Elements of reusable object-oriented software / Erich Gamma ... [et al.]. Boston : Addison-Wesley, 1995.

Architektúra softvérových systémov : Architektúra internetových systémov a architektúra orientovaná na služby / Ľubor Šešera, Peter Grec, Pavol Návrat. Bratislava : Slovenská technická univerzita, 2011.

Aplikačné architektúry softvérových systémov / Ľubor Šešera. Bratislava : Slovenská technická univerzita, 2012.

Čistý kód / Robert C. Martin ; překlad Jiří Berka. Brno : Computer Press, 2009.

Software engineering : Modern approaches / Eric J. Braude, Michael E. Bernstein. Hoboken : Wiley, 2011.

Sun Certified Enterprise Architect for Java EE study guide / Mark Cade, Humphrey Sheil. Upper Saddle River : Prentice Hall, 2010.

Jacobsen et al: The Essentials of Modern Software Engineering, Association for Computer Machinery and Morgan & Claypool Publishers, 2019.

**Languages necessary to complete the course:**

Slovak, English

**Notes:**

**Past grade distribution**

Total number of evaluated students: 982

A	B	C	D	E	FX
29,33	35,44	20,57	8,66	3,46	2,55

**Lecturers:** Mgr. Pavel Petrovič, PhD., doc. RNDr. Damas Gruska, PhD., RNDr. Michal Winczer, PhD.

**Last change:** 23.06.2022

**Approved by:** doc. RNDr. Damas Gruska, PhD.

## COURSE DESCRIPTION

<b>Academic year:</b> 2025/2026	
<b>University:</b> Comenius University Bratislava	
<b>Faculty:</b> Faculty of Mathematics, Physics and Informatics	
<b>Course ID:</b> FMFI.KAI/1-AIN-121/22	<b>Course title:</b> Discrete Mathematics (1)
<b>Educational activities:</b> <b>Type of activities:</b> course <b>Number of hours:</b> <b>per week: 6 per level/semester: 78</b> <b>Form of the course:</b> on-site learning	
<b>Number of credits:</b> 8	
<b>Recommended semester:</b> 1.	
<b>Educational level:</b> I.	
<b>Prerequisites:</b>	
<b>Course requirements:</b> Continuous assessment: graded homework, quizzes, activities in exercises, tests. The student must obtain at least 55% of points from the semester in order to take the final exam. Examination: an examination consisting of a written and an oral part. The student must obtain at least 50% from the written part. Approximate scale: A 90%, B 80%, C 70%, D 60%, E 55% Scale of assessment (preliminary/final): 50/50	
<b>Learning outcomes:</b> The lecture will provide students with the mathematical foundations necessary for the study of computer science. Students will also learn mathematical culture, way of thinking, and argumentation in mathematics, as well as basic proof techniques. After completing the course, they will have built a broad base of examples, on which they can demonstrate concepts and methods in mathematics, and also in other subjects, e.g. programming. They will have practical skills in working with concepts in discrete mathematics.	
<b>Class syllabus:</b> Introduction to combinatorics. Basic enumeration principles and combinatorial configurations. Basic combinatorial identities: Pascal's formula, binomial and multinomial theorems. Inclusion/exclusion principle Fundamentals of logic. Logic formulae: propositional-logical conjunctions, quantifiers. Basic types of mathematical proofs: proof of equality and equivalence, direct and indirect proofs, proof by contradiction, proof by case analysis. (Illustrated on basic number theory: divisibility, prime numbers, etc.) Inductive definitions and mathematical induction. Fundamentals of set theory. Basic set relations and operations. Binary relations: basic concepts, composition of relations, reverse relations.	

Mappings: basic concepts, composition of functions, discrete functions used in computer science.  
 Injective, surjective and bijective functions.  
 Inverse function.  
 Introduction to discrete probability.  
 Experiment and random event.  
 Bernoulli's scheme.  
 Conditional probability.  
 Bayesian theorem.

**Recommended literature:**

Discrete and combinatorial mathematics : An applied introduction / Ralph P. Grimaldi. Boston : Pearson/Addison-Wesley, 2004  
 Teória čísel / Štefan Znám. Bratislava : Alfa, 1986  
 Kombinatorika a teória grafov / Štefan Znám. Bratislava : Univerzita Komenského, 1989  
 Kombinatorika a teória grafov I / Martin Knor. Bratislava : Univerzita Komenského, 2000  
 Množiny a všeličo okolo nich / Lev Bukovský. Košice : Univerzita Pavla Jozefa Šafárika, 2005  
 Kapitoly z diskretní matematiky / Jiří Matoušek, Jaroslav Nešetřil. Praha : Karolinum, 2007  
 Concrete Mathematics : A Foundation for Computer Science / Ronald L. Graham, Donald E. Knuth, Oren Patashnik. Upper Saddle River : Addison-Wesley, 1994  
 T. Jajcayova, J. Komara: electronic texts published on web page and in MOODLE

**Languages necessary to complete the course:**

Slovak, English

**Notes:**

**Past grade distribution**

Total number of evaluated students: 992

A	B	C	D	E	FX
6,25	8,37	21,67	23,99	10,99	28,73

**Lecturers:** doc. RNDr. Tatiana Jajcayová, PhD., Ing. Ján Komara, PhD., Mgr. Peter Náther, PhD., prof. RNDr. Mária Lucká, PhD., doc. RNDr. Mária Markošová, PhD., Mgr. Andrej Mihálik, PhD., Mgr. Iveta Bečková, PhD.

**Last change:** 26.06.2022

**Approved by:** doc. RNDr. Damas Gruska, PhD.

## COURSE DESCRIPTION

<b>Academic year:</b> 2025/2026	
<b>University:</b> Comenius University Bratislava	
<b>Faculty:</b> Faculty of Mathematics, Physics and Informatics	
<b>Course ID:</b> FMFI.KAI/1-AIN-160/22	<b>Course title:</b> Discrete Mathematics (2)
<b>Educational activities:</b> <b>Type of activities:</b> course <b>Number of hours:</b> <b>per week:</b> 4 <b>per level/semester:</b> 52 <b>Form of the course:</b> on-site learning	
<b>Number of credits:</b> 8	
<b>Recommended semester:</b> 2.	
<b>Educational level:</b> I.	
<b>Prerequisites:</b> FMFI.KAI/1-AIN-121/22 - Discrete Mathematics (1)	
<b>Recommended prerequisites:</b> 1-AIN-121/15 Discrete Mathematics 1	
<b>Antirequisites:</b> FMFI.KAI/1-AIN-160/00	
<b>Course requirements:</b> Continuous assessment: graded homework, quizzes, activities in exercises, tests. The student must obtain at least 55% of points from the semester in order to take the final exam. Examination: an examination consisting of a written and an oral part. The student must obtain at least 50% of the points from the written part. Approximate scale: A 90%, B 80%, C 70%, D 60%, E 55% Scale of assessment (preliminary/final): 50/50	
<b>Learning outcomes:</b> The lecture continues to build the mathematical foundations, as well as more advanced concepts of discrete mathematics necessary for the study of computer science, with an emphasis on the algorithmic approach, applications in computer science and programming. Students will be trained in mathematical culture and way of thinking and argumentation in mathematics.	
<b>Class syllabus:</b> Relations on a set, representations of relations (sets, graphs and matrices), properties of relations, (Illustrated on basic number theory: divisibility, prime numbers, modular arithmetic, etc.) important relations (equivalence, partial orders), partitions of a set. Graph theory, basic concepts. Advanced enumeration: principles, algorithms and complexity analysis of these algorithms. Set theory - cardinalities of sets, countable and uncountable sets. (Illustrated on the basic theory of formal languages and combinatorics on words.) Cantor's diagonalization method. Recurrence relations, homogeneous, inhomogeneous, solutions of recurrence equations of the 1st and 2nd order (in the case of complex roots, review of basic operations and properties, trigonometric form of complex numbers.) Applications to the complexity analysis of algorithms. Generating functions.	

**Recommended literature:**

Discrete and combinatorial mathematics : An applied introduction / Ralph P. Grimaldi. Boston : Pearson/Addison-Wesley, 2004

Teória čísel / Štefan Znám. Bratislava : Alfa, 1986

Kombinatorika a teória grafov / Štefan Znám. Bratislava : Univerzita Komenského, 1989

Kombinatorika a teória grafov I / Martin Knor. Bratislava : Univerzita Komenského, 2000

Množiny a všeličo okolo nich / Lev Bukovský. Košice : Univerzita Pavla Jozefa Šafárika, 2005

Kapitoly z diskretní matematiky / Jiří Matoušek, Jaroslav Nešetřil. Praha : Karolinum, 2007

Concrete Mathematics : A Foundation for Computer Science / Ronald L. Graham, Donald E.

Knuth, Oren Patashnik. Upper Saddle River : Addison-Wesley, 1994

T. Jajcayova, J. Komara: electronic texts published on web page and in MOODLE

**Languages necessary to complete the course:**

Slovak, English

**Notes:****Past grade distribution**

Total number of evaluated students: 713

A	B	C	D	E	FX
6,31	8,84	16,41	29,59	18,09	20,76

**Lecturers:** doc. RNDr. Tatiana Jajcayová, PhD., Ing. Ján Komara, PhD., Mgr. Peter Náther, PhD.

**Last change:** 26.06.2022

**Approved by:** doc. RNDr. Damas Gruska, PhD.

## COURSE DESCRIPTION

<b>Academic year:</b> 2025/2026	
<b>University:</b> Comenius University Bratislava	
<b>Faculty:</b> Faculty of Mathematics, Physics and Informatics	
<b>Course ID:</b> FMFI.KAI/1-AIN-105/22	<b>Course title:</b> Efficient Algorithms and Data Structures
<b>Educational activities:</b> <b>Type of activities:</b> lecture / practicals <b>Number of hours:</b> <b>per week:</b> 4 / 2 <b>per level/semester:</b> 52 / 26 <b>Form of the course:</b> on-site learning	
<b>Number of credits:</b> 8	
<b>Recommended semester:</b> 3.	
<b>Educational level:</b> I.	
<b>Prerequisites:</b> FMFI.KAI+KDMFI/1-AIN-170/22 - Programming (2) and FMFI.KAI/1-AIN-121/22 - Discrete Mathematics (1)	
<b>Course requirements:</b> Continuing evaluation: homework assignments (30%), midterm (20%) Exam: written with oral consultation (50%) To successfully complete the course, student has to obtain at least 50% of points on the final exam Final grade: A 90%, B 80%, C 70%, D 60%, E 50% Scale of assessment (preliminary/final): 50/50	
<b>Learning outcomes:</b> Students will learn the basics of data structures and will be able to use basic methods of designing efficient algorithms. They will be able to work with basic concepts of computational complexity.	
<b>Class syllabus:</b> Computational complexity. Sorting algorithms. Priority queue. Dictionary. Text search. Methods of designing efficient algorithms (greedy algorithms, dynamic programming, divide and conquer). Representations of graphs and elementary graph algorithms. NP-hard and NP-complete problems.	
<b>Recommended literature:</b> Fundamentals of algorithmics / Gilles Brassard, Paul Bratley. Englewood Cliffs : Prentice-Hall, 1996 Data Structures and Algorithms in Python / Michael T. Goodrich, Roberto Tamassia, Michael H. Goldwasser. John Wiley & Sons, 2013. Introduction to algorithms / Thomas H. Cormen ... [et al.]. Cambridge, Mass. : MIT Press, 2001 Programming pearls / Jon Bentley. Reading : Addison-Wesley, 1986	
<b>Languages necessary to complete the course:</b>	
<b>Notes:</b>	

<b>Past grade distribution</b>					
Total number of evaluated students: 335					
A	B	C	D	E	FX
9,85	10,15	17,61	22,99	21,79	17,61
<b>Lecturers:</b> doc. Mgr. Tomáš Vinař, PhD.					
<b>Last change:</b> 24.06.2022					
<b>Approved by:</b> doc. RNDr. Damas Gruska, PhD.					



## COURSE DESCRIPTION

<b>Academic year:</b> 2025/2026					
<b>University:</b> Comenius University Bratislava					
<b>Faculty:</b> Faculty of Mathematics, Physics and Informatics					
<b>Course ID:</b> FMFI.KAI/1-AIN-311/22		<b>Course title:</b> Embedded Linux			
<b>Educational activities:</b> <b>Type of activities:</b> course <b>Number of hours:</b> <b>per week:</b> 2 <b>per level/semester:</b> 26 <b>Form of the course:</b> on-site learning					
<b>Number of credits:</b> 2					
<b>Recommended semester:</b> 5.					
<b>Educational level:</b> I.					
<b>Prerequisites:</b>					
<b>Course requirements:</b>					
<b>Learning outcomes:</b>					
<b>Class syllabus:</b>					
<b>Recommended literature:</b>					
<b>Languages necessary to complete the course:</b>					
<b>Notes:</b>					
<b>Past grade distribution</b> Total number of evaluated students: 43					
A	B	C	D	E	FX
34,88	32,56	27,91	4,65	0,0	0,0
<b>Lecturers:</b> RNDr. Jozef Šiška, PhD.					
<b>Last change:</b> 04.03.2022					
<b>Approved by:</b> doc. RNDr. Damas Gruska, PhD.					

## COURSE DESCRIPTION

<b>Academic year:</b> 2025/2026					
<b>University:</b> Comenius University Bratislava					
<b>Faculty:</b> Faculty of Mathematics, Physics and Informatics					
<b>Course ID:</b> FMFI.KJP/1-MXX-233/13		<b>Course title:</b> English Conversation Course (1)			
<b>Educational activities:</b> <b>Type of activities:</b> practicals <b>Number of hours:</b> <b>per week: 2 per level/semester: 26</b> <b>Form of the course:</b> on-site learning					
<b>Number of credits:</b> 2					
<b>Recommended semester:</b> 3., 5.					
<b>Educational level:</b> I., I.II., II.					
<b>Prerequisites:</b>					
<b>Course requirements:</b> tests, presentations, essays Course prerequisites: <a href="https://fmph.uniba.sk/microsites/kjp/katedra-jazykovej-pripravy/poziadavky-na-udelenie-priebezhneho-hodnotenia-aj1aj2aj3-ostatne-kurzy/">https://fmph.uniba.sk/microsites/kjp/katedra-jazykovej-pripravy/poziadavky-na-udelenie-priebezhneho-hodnotenia-aj1aj2aj3-ostatne-kurzy/</a> Scale of assessment (preliminary/final): 100/0					
<b>Learning outcomes:</b> 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.					
<b>Class syllabus:</b> This course's focus is to broaden spoken/communicational English for students with B2/C1 level of English knowledge.					
<b>Recommended literature:</b> 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).					
<b>Languages necessary to complete the course:</b>					
<b>Notes:</b>					
<b>Past grade distribution</b> Total number of evaluated students: 291					
A	B	C	D	E	FX
75,26	9,62	4,81	1,37	1,03	7,9
<b>Lecturers:</b> Mgr. Aneta Barnes					

<b>Last change:</b> 11.04.2024
<b>Approved by:</b> doc. RNDr. Damas Gruska, PhD.

## COURSE DESCRIPTION

<b>Academic year:</b> 2025/2026					
<b>University:</b> Comenius University Bratislava					
<b>Faculty:</b> Faculty of Mathematics, Physics and Informatics					
<b>Course ID:</b> FMFI.KJP/1-MXX-234/13		<b>Course title:</b> English Conversation Course (2)			
<b>Educational activities:</b> <b>Type of activities:</b> practicals <b>Number of hours:</b> <b>per week: 2 per level/semester: 26</b> <b>Form of the course:</b> on-site learning					
<b>Number of credits:</b> 2					
<b>Recommended semester:</b> 4., 6.					
<b>Educational level:</b> I., I.II., II.					
<b>Prerequisites:</b>					
<b>Course requirements:</b> tests, oral presentations, essays Course prerequisites: <a href="https://fmph.uniba.sk/microsites/kjp/katedra-jazykovej-pripravy/poziadavky-na-udelenie-priebezhneho-hodnotenia-aj1aj2aj3-ostatne-kurzy/">https://fmph.uniba.sk/microsites/kjp/katedra-jazykovej-pripravy/poziadavky-na-udelenie-priebezhneho-hodnotenia-aj1aj2aj3-ostatne-kurzy/</a> Scale of assessment (preliminary/final): 100/0					
<b>Learning outcomes:</b> 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.					
<b>Class syllabus:</b> This course's focus is to broaden spoken/communicational English for students with B2/C1 level of English knowledge( Upper-Intermediate/Lower Advanced).					
<b>Recommended literature:</b> 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).					
<b>Languages necessary to complete the course:</b>					
<b>Notes:</b>					
<b>Past grade distribution</b> Total number of evaluated students: 201					
A	B	C	D	E	FX
82,09	8,96	2,49	1,0	0,0	5,47
<b>Lecturers:</b> Mgr. Aneta Barnes					

<b>Last change:</b> 11.04.2024
<b>Approved by:</b> doc. RNDr. Damas Gruska, PhD.

## COURSE DESCRIPTION

<b>Academic year:</b> 2025/2026	
<b>University:</b> Comenius University Bratislava	
<b>Faculty:</b> Faculty of Mathematics, Physics and Informatics	
<b>Course ID:</b> FMFI.KJP/1-MXX-131/00	<b>Course title:</b> English Language (1)
<b>Educational activities:</b> <b>Type of activities:</b> practicals <b>Number of hours:</b> <b>per week: 2 per level/semester: 26</b> <b>Form of the course:</b> on-site learning	
<b>Number of credits:</b> 2	
<b>Recommended semester:</b> 1.	
<b>Educational level:</b> I., I.II.	
<b>Prerequisites:</b>	
<b>Course requirements:</b> Grades: A 93%, B 85%, C 77%, D 70%, E 65% Course prerequisites: <a href="https://fmph.uniba.sk/microsites/kjp/katedra-jazykovej-pripravy/poziadavky-na-udelenie-priebežneho-hodnotenia-aj1aj2aj3-ostatne-kurzy/">https://fmph.uniba.sk/microsites/kjp/katedra-jazykovej-pripravy/poziadavky-na-udelenie-priebežneho-hodnotenia-aj1aj2aj3-ostatne-kurzy/</a> Scale of assessment (preliminary/final): 100/0	
<b>Learning outcomes:</b> 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.	
<b>Class syllabus:</b> 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 mathematics.	
<b>Recommended literature:</b> 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.	

<b>Languages necessary to complete the course:</b> Slovak, English					
<b>Notes:</b>					
<b>Past grade distribution</b> Total number of evaluated students: 7132					
A	B	C	D	E	FX
29,54	23,11	18,17	12,56	7,84	8,78
<b>Lecturers:</b> Mgr. Eva Foltánová, Mgr. Ing. Jana Kočvarová, Mgr. Ľubomíra Kožehubová, Mgr. Alexandra Maďarová, PhDr. Alena Zemanová, Mgr. Aneta Barnes, Mgr. Simona Dobiašová, PhD.					
<b>Last change:</b> 20.06.2022					
<b>Approved by:</b> doc. RNDr. Damas Gruska, PhD.					

## COURSE DESCRIPTION

<b>Academic year:</b> 2025/2026					
<b>University:</b> Comenius University Bratislava					
<b>Faculty:</b> Faculty of Mathematics, Physics and Informatics					
<b>Course ID:</b> FMFI.KJP/1-MXX-132/00		<b>Course title:</b> English Language (2)			
<b>Educational activities:</b> <b>Type of activities:</b> practicals <b>Number of hours:</b> <b>per week: 2 per level/semester: 26</b> <b>Form of the course:</b> on-site learning					
<b>Number of credits:</b> 2					
<b>Recommended semester:</b> 2.					
<b>Educational level:</b> I., I.II.					
<b>Prerequisites:</b>					
<b>Course requirements:</b> Grades: A 93%, B 85%, C 77%, D 70%, E 65% Course prerequisites: <a href="https://fmph.uniba.sk/microsites/kjp/katedra-jazykovej-pripravy/poziadavky-na-udelenie-priebezhneho-hodnotenia-aj1aj2aj3-ostatne-kurzy/">https://fmph.uniba.sk/microsites/kjp/katedra-jazykovej-pripravy/poziadavky-na-udelenie-priebezhneho-hodnotenia-aj1aj2aj3-ostatne-kurzy/</a> Scale of assessment (preliminary/final): 100/0					
<b>Learning outcomes:</b> 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.					
<b>Class syllabus:</b> 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.					
<b>Recommended literature:</b> 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.					
<b>Languages necessary to complete the course:</b> Slovak, English					
<b>Notes:</b>					
<b>Past grade distribution</b> Total number of evaluated students: 1733					
A	B	C	D	E	FX
22,1	20,95	23,83	14,77	11,08	7,27



<b>Lecturers:</b> PhDr. Alena Zemanová, Mgr. Ing. Jana Kočvarová, Mgr. Alexandra Maďarová, Mgr. Lubomíra Kožehubová, Mgr. Eva Foltánová, Mgr. Aneta Barnes, Mgr. Simona Dobiašová, PhD.
<b>Last change:</b> 20.06.2022
<b>Approved by:</b> doc. RNDr. Damas Gruska, PhD.

## COURSE DESCRIPTION

<b>Academic year:</b> 2025/2026	
<b>University:</b> Comenius University Bratislava	
<b>Faculty:</b> Faculty of Mathematics, Physics and Informatics	
<b>Course ID:</b> FMFI.KJP/1-MXX-231/00	<b>Course title:</b> English Language (3)
<b>Educational activities:</b> <b>Type of activities:</b> practicals <b>Number of hours:</b> <b>per week: 2 per level/semester: 26</b> <b>Form of the course:</b> on-site learning	
<b>Number of credits:</b> 2	
<b>Recommended semester:</b> 3.	
<b>Educational level:</b> I., I.II.	
<b>Prerequisites:</b>	
<b>Course requirements:</b> Grades: A 93%, B 85%, C 77%, D 70%, E 65% Course prerequisites: <a href="https://fmph.uniba.sk/microsites/kjp/katedra-jazykovej-pripravy/poziadavky-na-udelenie-priebežneho-hodnotenia-aj1aj2aj3-ostatne-kurzy/">https://fmph.uniba.sk/microsites/kjp/katedra-jazykovej-pripravy/poziadavky-na-udelenie-priebežneho-hodnotenia-aj1aj2aj3-ostatne-kurzy/</a> Scale of assessment (preliminary/final): 100/0	
<b>Learning outcomes:</b> 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.	
<b>Class syllabus:</b> 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 mathematics. The subject requires advanced knowledge of general English.	
<b>Recommended literature:</b> 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.	
<b>Languages necessary to complete the course:</b>	

Slovak, English					
<b>Notes:</b>					
<b>Past grade distribution</b>					
Total number of evaluated students: 1422					
A	B	C	D	E	FX
15,47	19,06	22,78	18,35	18,0	6,33
<b>Lecturers:</b> PhDr. Alena Zemanová, Mgr. Ing. Jana Kočvarová, Mgr. Alexandra Maďarová, Mgr. Lubomíra Kožehubová, Mgr. Eva Foltánová, Mgr. Aneta Barnes, Mgr. Simona Dobiašová, PhD.					
<b>Last change:</b> 20.06.2022					
<b>Approved by:</b> doc. RNDr. Damas Gruska, PhD.					

## COURSE DESCRIPTION

<b>Academic year:</b> 2025/2026	
<b>University:</b> Comenius University Bratislava	
<b>Faculty:</b> Faculty of Mathematics, Physics and Informatics	
<b>Course ID:</b> FMFI.KJP/1-MXX-232/10	<b>Course title:</b> English Language (4)
<b>Educational activities:</b> <b>Type of activities:</b> practicals <b>Number of hours:</b> <b>per week: 2 per level/semester: 26</b> <b>Form of the course:</b> on-site learning	
<b>Number of credits:</b> 2	
<b>Recommended semester:</b> 4.	
<b>Educational level:</b> I., I.II.	
<b>Prerequisites:</b>	
<b>Course requirements:</b> Examination: an examination consisting of a written and an oral part. Grades: A 93%, B 85%, C 77%, D 70%, E 65% Course prerequisites: <a href="https://fmph.uniba.sk/microsites/kjp/katedra-jazykovej-pripravy/skuska-z-predmetu-anglicky-jazyk-4/">https://fmph.uniba.sk/microsites/kjp/katedra-jazykovej-pripravy/skuska-z-predmetu-anglicky-jazyk-4/</a> Scale of assessment (preliminary/final): 0/100	
<b>Learning outcomes:</b> After completing the course, students will be able to work independently with professional literature in English	
<b>Class syllabus:</b> 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 mathematics.	
<b>Recommended literature:</b> 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.	
<b>Languages necessary to complete the course:</b> Slovak, English	

<b>Notes:</b>					
<b>Past grade distribution</b>					
Total number of evaluated students: 4292					
A	B	C	D	E	FX
25,19	28,1	21,6	11,84	6,06	7,22
<b>Lecturers:</b> Mgr. Ing. Jana Kočvarová, Mgr. Alexandra Maďarová, PhDr. Alena Zemanová, Mgr. Lubomíra Kožehubová, Mgr. Eva Foltánová, Mgr. Aneta Barnes, Mgr. Simona Dobiašová, PhD.					
<b>Last change:</b> 17.06.2022					
<b>Approved by:</b> doc. RNDr. Damas Gruska, PhD.					

## COURSE DESCRIPTION

<b>Academic year:</b> 2025/2026	
<b>University:</b> Comenius University Bratislava	
<b>Faculty:</b> Faculty of Mathematics, Physics and Informatics	
<b>Course ID:</b> FMFI.KAI/1-AIN-670/22	<b>Course title:</b> Expert Systems
<b>Educational activities:</b> <b>Type of activities:</b> lecture / practicals <b>Number of hours:</b> <b>per week:</b> 2 / 2 <b>per level/semester:</b> 26 / 26 <b>Form of the course:</b> on-site learning	
<b>Type, volume, methods and workload of the student - additional information</b> Type of educational activities: 2/2 (lecture/exercise) Number of credits: 6 Recommended semester: applied informatics 3/S Educational level: I Prerequisites: none Course requirements: Examination: examination is in written and oral form, two programming tasks and one theoretical question Continuous assessment: 0 Approximate evaluation scale: A 90%, B 80%, C 70%, D 60%, E 50% Scale of assessment (preliminary/final): 0/100	
<b>Number of credits:</b> 6	
<b>Recommended semester:</b> 6.	
<b>Educational level:</b> I.	
<b>Prerequisites:</b>	
<b>Recommended prerequisites:</b> None	
<b>Course requirements:</b> Examination: examination is in written and oral form, two programming tasks and one theoretical question Continuous assessment: 0 Approximate evaluation scale: A 90%, B 80%, C 70%, D 60%, E 50% Scale of assessment (preliminary/final): 0/100	
<b>Learning outcomes:</b> Learning outcomes: To provide students knowledge in the field of expert/knowledge systems and rule-based programming.	
<b>Class syllabus:</b> Class syllabus: - The principles and architecture of expert/knowledge systems - Production systems - Handling with facts and rules - Inference in production systems - Database examples - A simulation of recursion - A simulation of backward chaining - Memorising - Sorts in production systems - Solving problems by constraint satisfaction - Examples from the field of artificial intelligence - Stratification - Controlling inference in production systems - Introduction to fuzzy mathematics and inference	
<b>Recommended literature:</b> Recommended literature: Giarratano, Joseph C., and Gary D. Riley. Expert systems: principles and programming. Brooks/Cole Publishing Co., 2005. Tadeusiewicz, Ryszard. "Introduction to intelligent systems." Intelligent systems. CRC Press, 2018. Smith, Suzanne, and Abraham Kandel. Verification and validation of rule-based expert systems. CRC Press, 2018.	

Krishnamoorthy, C. S., and S. Rajeev. Artificial Intelligence and Expert Systems for Artificial Intelligence Engineers. CRC press, 2018.

**Languages necessary to complete the course:**

Slovak, English

**Notes:**

**Past grade distribution**

Total number of evaluated students: 294

A	B	C	D	E	FX
21,77	13,27	35,03	14,63	11,56	3,74

**Lecturers:** doc. RNDr. Dušan Guller, PhD.

**Last change:** 26.06.2022

**Approved by:** doc. RNDr. Damas Gruska, PhD.

## COURSE DESCRIPTION

<b>Academic year:</b> 2025/2026	
<b>University:</b> Comenius University Bratislava	
<b>Faculty:</b> Faculty of Mathematics, Physics and Informatics	
<b>Course ID:</b> FMFI.KAI/2-AIN-133/15	<b>Course title:</b> Extreme Programming
<b>Educational activities:</b> <b>Type of activities:</b> course <b>Number of hours:</b> <b>per week:</b> 4 <b>per level/semester:</b> 52 <b>Form of the course:</b> on-site learning	
<b>Type, volume, methods and workload of the student - additional information</b> EN After completing the course, students will be able to use the methods and techniques Extreme Programming methodology: pair programming, writing and using unit tests, test driven programming, clean code, refactoring, code review, working with legacy code. Agile using of ChatGPT – advantages and drawbacks. Principles of agile project management methodology in the form of extreme programming.	
<b>Number of credits:</b> 6	
<b>Recommended semester:</b> 6.	
<b>Educational level:</b> I., II.	
<b>Prerequisites:</b>	
<b>Recommended prerequisites:</b> No	
<b>Antirequisites:</b> FMFI.KAI/1-AIN-680/00	
<b>Course requirements:</b> Continuous evaluation: exercises, presentations, homework assignments (50%), final exam (30%), final essay: (20%). Final grade: A 90%, B 80%, C 70%, D 60%, E 50% Scale of assessment (preliminary/final): 50/50	
<b>Learning outcomes:</b> After completing the course, students will be able to use the methods and techniques of extreme programming methodology: pair programming, defining and use of unit tests, test driven programming, clean code, refactoring, code review, working with legacy code. Using Chat GPT in programming: advantages and drawbacks. They will be able to organize work according methodology of extreme programming.	
<b>Class syllabus:</b> History of software engineering, life cycle of software systems, traditional and agile methodologies, pillars of extreme programming (XP): pairwise programming, test driven programming, typology of tests and their use, refactoring and its techniques, principles of writing clean code, code review, legacy code, principles of project management in XP. ChatGPT in programming: advantages and drawbacks.	
<b>Recommended literature:</b>	



Beck, Kent, 1999: Extreme Programming Explained, Addison-Wesley Professional, Martin, Robert C. 2008: Clean Code: A Handbook of Agile Software Craftsmanship, Pearson; 1st edition, Fowler, Martin, 2018: Refactoring: Improving the Design of Existing Code, Addison-Wesley Langr, Jeff, 2013: Modern C++ Programming with Test-Driven Development, The Pragmatic programmers, LLC Amr Noaman, 2018: Refactoring to Clean Code. Concepts and Techniques for Taming Wild Code, The Pragmatic Bookshelf, Dallas, <http://leanpub.com/RefactoringToCleanCode> Feathers, Michael C, 2005: Working Effectively with Legacy Code, Prentice Hall Bernstein, David Scott, 2015: Beyond Legacy Code, Nine Practices to Extend the Life (and Value) of Your Software, The Pragmatic Bookshelf, Dallas, Texas – Raleigh, North Carolina Whittaker, James A., 2011, Exploratory Software Testing, Addison-Wesley, Callaghan, Michael D., 2023, Pair Programming with ChatGPT, Independently published

**Languages necessary to complete the course:**

Slovak, English

**Notes:**

**Past grade distribution**

Total number of evaluated students: 354

A	B	C	D	E	FX
64,97	9,04	9,89	5,65	6,5	3,95

**Lecturers:** Ing. František Gyarfaš, CSc., Mgr. Ivor Uhliarík, PhD.

**Last change:** 23.08.2023

**Approved by:** doc. RNDr. Damas Gruska, PhD.

## COURSE DESCRIPTION

<b>Academic year:</b> 2025/2026					
<b>University:</b> Comenius University Bratislava					
<b>Faculty:</b> Faculty of Mathematics, Physics and Informatics					
<b>Course ID:</b> FMFL.KJP/1-MXX-141/00		<b>Course title:</b> French Language (1)			
<b>Educational activities:</b> <b>Type of activities:</b> practicals <b>Number of hours:</b> <b>per week: 2 per level/semester: 26</b> <b>Form of the course:</b> on-site learning					
<b>Number of credits:</b> 2					
<b>Recommended semester:</b> 1.					
<b>Educational level:</b> I., I.II., II.					
<b>Prerequisites:</b>					
<b>Course requirements:</b> Scale of assessment (preliminary/final): 100/0					
<b>Learning outcomes:</b>					
<b>Class syllabus:</b> 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.					
<b>Recommended literature:</b> Capelle Guy, Menand Robert: Le Nouveau taxi 1, Hachette FLE Paris, France 2009, ISBN 978-2-01-155548 - 9					
<b>Languages necessary to complete the course:</b>					
<b>Notes:</b>					
<b>Past grade distribution</b> Total number of evaluated students: 482					
A	B	C	D	E	FX
48,76	19,09	17,01	8,09	2,07	4,98
<b>Lecturers:</b> Mgr. Ľubomíra Kožehubová					
<b>Last change:</b> 20.06.2022					
<b>Approved by:</b> doc. RNDr. Damas Gruska, PhD.					

## COURSE DESCRIPTION

<b>Academic year:</b> 2025/2026					
<b>University:</b> Comenius University Bratislava					
<b>Faculty:</b> Faculty of Mathematics, Physics and Informatics					
<b>Course ID:</b> FMFL.KJP/1-MXX-142/00		<b>Course title:</b> French Language (2)			
<b>Educational activities:</b> <b>Type of activities:</b> practicals <b>Number of hours:</b> <b>per week: 2 per level/semester: 26</b> <b>Form of the course:</b> on-site learning					
<b>Number of credits:</b> 2					
<b>Recommended semester:</b> 2.					
<b>Educational level:</b> I., I.II., II.					
<b>Prerequisites:</b>					
<b>Course requirements:</b> Scale of assessment (preliminary/final): 100/0					
<b>Learning outcomes:</b>					
<b>Class syllabus:</b> The subject continues the program of French language (1) and provides courses of essential and intermediate French language.					
<b>Recommended literature:</b> Capelle Guy, Menand Robert: Le Nouveau taxi 1, Hachette FLE Paris, France 2009, ISBN 978-2-01-155548 - 9					
<b>Languages necessary to complete the course:</b>					
<b>Notes:</b>					
<b>Past grade distribution</b> Total number of evaluated students: 307					
A	B	C	D	E	FX
45,6	22,48	16,94	8,79	2,28	3,91
<b>Lecturers:</b> Mgr. Ľubomíra Kožehubová					
<b>Last change:</b> 20.06.2022					
<b>Approved by:</b> doc. RNDr. Damas Gruska, PhD.					

## COURSE DESCRIPTION

<b>Academic year:</b> 2025/2026					
<b>University:</b> Comenius University Bratislava					
<b>Faculty:</b> Faculty of Mathematics, Physics and Informatics					
<b>Course ID:</b> FMFL.KJP/1-MXX-241/00		<b>Course title:</b> French Language (3)			
<b>Educational activities:</b> <b>Type of activities:</b> practicals <b>Number of hours:</b> <b>per week: 2 per level/semester: 26</b> <b>Form of the course:</b> on-site learning					
<b>Number of credits:</b> 2					
<b>Recommended semester:</b> 3.					
<b>Educational level:</b> I., I.II., II.					
<b>Prerequisites:</b>					
<b>Course requirements:</b> Scale of assessment (preliminary/final): 100/0					
<b>Learning outcomes:</b>					
<b>Class syllabus:</b> The subject provides a course of intermediate French language, covering not only general, but also technical language.					
<b>Recommended literature:</b> Capelle Guy, Menand Robert: Le Nouveau taxi 1, Hachette FLE Paris, France 2009, ISBN 978-2-01-155548 - 9					
<b>Languages necessary to complete the course:</b>					
<b>Notes:</b>					
<b>Past grade distribution</b> Total number of evaluated students: 120					
A	B	C	D	E	FX
45,83	25,83	18,33	5,83	0,83	3,33
<b>Lecturers:</b> Mgr. Ľubomíra Kožehubová					
<b>Last change:</b> 20.06.2022					
<b>Approved by:</b> doc. RNDr. Damas Gruska, PhD.					

## COURSE DESCRIPTION

<b>Academic year:</b> 2025/2026					
<b>University:</b> Comenius University Bratislava					
<b>Faculty:</b> Faculty of Mathematics, Physics and Informatics					
<b>Course ID:</b> FMFI.KJP/1-MXX-242/00		<b>Course title:</b> French Language (4)			
<b>Educational activities:</b> <b>Type of activities:</b> practicals <b>Number of hours:</b> <b>per week: 2 per level/semester: 26</b> <b>Form of the course:</b> on-site learning					
<b>Number of credits:</b> 2					
<b>Recommended semester:</b> 4.					
<b>Educational level:</b> I., I.II., II.					
<b>Prerequisites:</b>					
<b>Course requirements:</b> Scale of assessment (preliminary/final): 100/0					
<b>Learning outcomes:</b>					
<b>Class syllabus:</b> The subject provides a course of intermediate French covering not only general, but also technical French language.					
<b>Recommended literature:</b> Menand Robert: Le Nouveau taxi 2, Hachette FLE, Paris, France 2009, ISBN 978-2-01-155551 - 9					
<b>Languages necessary to complete the course:</b>					
<b>Notes:</b>					
<b>Past grade distribution</b> Total number of evaluated students: 79					
A	B	C	D	E	FX
43,04	32,91	16,46	2,53	1,27	3,8
<b>Lecturers:</b> Mgr. Ľubomíra Kožehubová					
<b>Last change:</b> 20.06.2022					
<b>Approved by:</b> doc. RNDr. Damas Gruska, PhD.					

## COURSE DESCRIPTION

<b>Academic year:</b> 2025/2026	
<b>University:</b> Comenius University Bratislava	
<b>Faculty:</b> Faculty of Mathematics, Physics and Informatics	
<b>Course ID:</b> FMFI.KAI/1-AIN-301/22	<b>Course title:</b> Fundamentals of Computer Graphics and Image Processing
<b>Educational activities:</b> <b>Type of activities:</b> lecture / practicals <b>Number of hours:</b> <b>per week:</b> 2 / 2 <b>per level/semester:</b> 26 / 26 <b>Form of the course:</b> on-site learning	
<b>Number of credits:</b> 6	
<b>Recommended semester:</b> 5.	
<b>Educational level:</b> I.	
<b>Prerequisites:</b>	
<b>Antirequisites:</b> FMFI.KAI+KAGDM/1-AIN-240/00	
<b>Course requirements:</b> Continuing evaluation: exercise assignments (50%). Exam: written exam (50%). To successfully complete the course, student has to obtain at least 50% of points on the exercise assignments and at least 50% on the final exam. Final grade: A 90%, B 80%, C 70%, D 60%, E 50%. Scale of assessment (preliminary/final): Continuing evaluation/Exam: 50/50.	
<b>Learning outcomes:</b> The graduate will master the basic techniques of image processing, such as basic image transformations, basic techniques of image preprocessing (image filtering, edge detection), basic principles of segmentation. The graduate is familiar with the basics of modeling and rendering procedures, computer animation and multimedia, can implement selected graphics algorithms and understands their mathematical background.	
<b>Class syllabus:</b> Rendering of 3D graphics, calculation of light and shadows, photorealism. Representations of 3D objects (parametric, polygonal). Modeling techniques (box modeling, parametric modeling, procedural). Computer animation (keyframe technique, tweening, procedural animation) Color spaces, additive and subtractive color models. Color depth. Raster and vector graphics. 2D graphic formats. Multimedia, 2D image compression, video compression, codecs. Computer graphics applications: industrial and graphic design, computer games, virtual reality, scientific visualization. Image digitization and its properties Image preprocessing (image filtering, edge detection) Segmentation (basic approaches)	

Case studies (selected topics)					
<b>Recommended literature:</b> Digital image processing / Rafael C. Gonzalez, Richard E. Woods. Upper Saddle River : Prentice-Hall, 2002 Hughes: Computer Graphics Principles and Practice, ISBN: 978-0-321399-52-6					
<b>Languages necessary to complete the course:</b> Slovak, English					
<b>Notes:</b>					
<b>Past grade distribution</b> Total number of evaluated students: 145					
A	B	C	D	E	FX
16,55	24,14	27,59	19,31	7,59	4,83
<b>Lecturers:</b> doc. RNDr. Martin Madaras, PhD., RNDr. Zuzana Berger Haladová, PhD.					
<b>Last change:</b> 27.06.2022					
<b>Approved by:</b> doc. RNDr. Damas Gruska, PhD.					

## COURSE DESCRIPTION

<b>Academic year:</b> 2025/2026	
<b>University:</b> Comenius University Bratislava	
<b>Faculty:</b> Faculty of Mathematics, Physics and Informatics	
<b>Course ID:</b> FMFI.KAI/1-AIN-303/24	<b>Course title:</b> Game Engines
<b>Educational activities:</b> <b>Type of activities:</b> course <b>Number of hours:</b> <b>per week: 4 per level/semester: 52</b> <b>Form of the course:</b> on-site learning	
<b>Number of credits:</b> 5	
<b>Recommended semester:</b> 5.	
<b>Educational level:</b> I.	
<b>Prerequisites:</b>	
<b>Recommended prerequisites:</b> none	
<b>Course requirements:</b> Preliminary assessment: the project implementation The indicative evaluation scale : A 90%, B 80%, C 70%, D 60%, E 50% Scale of assessment (preliminary/final): Scale of assessment (preliminary/final): 100/0	
<b>Learning outcomes:</b> After completing the course, students will be able to work with freely available game systems and will be able to create a game and other visualization applications using these systems. Primarily, they will be able to work with the Unreal Engine environment.	
<b>Class syllabus:</b> Review from basic ch gaming systems Description of game system architecture , editing options , creation of objects, import of models and materials, creation of own materials, creation of game maps, creation of terrain, procedural map generation, visual programming using Blueprints (functions, macros, structures, classes) and their connection with the scene . Working with input (mouse, keyboard) , playing sounds, playing and mixing animations, physics simulations, particle systems , explosions , player interaction with game objects, collisions, spatial triggers, projectiles and hits , laser beams , control of characters by the player - movement, jumping, flying, swimming, falling; working with the camera, playing cut scenes, computer-controlled characters, artificial intelligence, decision trees, blackboard, perception and reaction to events in the environment. Map switching, state transfer between maps, saving and loading game state , GUI and HUD programming, loading screens . Network games and connection with external programs.	
<b>Recommended literature:</b> Official Unreal Engine technology documentation. Own electronic texts. 3D game engine design : A practical approach to Real-Time computer graphics / David H. Eberly. Amsterdam: Elsevier, 2007	



Real-time rendering / Tomas Akenine - Möller , Eric Haines, Naty Hoffman. Wellesley : AK Peters, 2008

**Languages necessary to complete the course:**

Slovak, English

**Notes:**

**Past grade distribution**

Total number of evaluated students: 201

A	B	C	D	E	FX
33,83	22,89	12,44	4,98	1,49	24,38

**Lecturers:** doc. RNDr. Martin Takáč, PhD., Ing. Alexander Šimko, PhD., Mgr. Lukáš Gajdošech

**Last change:** 02.09.2024

**Approved by:** doc. RNDr. Damas Gruska, PhD.

## COURSE DESCRIPTION

<b>Academic year:</b> 2025/2026	
<b>University:</b> Comenius University Bratislava	
<b>Faculty:</b> Faculty of Mathematics, Physics and Informatics	
<b>Course ID:</b> FMFI.KAI/1-AIN-307/24	<b>Course title:</b> Game Engines (2)
<b>Educational activities:</b> <b>Type of activities:</b> course <b>Number of hours:</b> <b>per week:</b> 4 <b>per level/semester:</b> 52 <b>Form of the course:</b> on-site learning	
<b>Number of credits:</b> 5	
<b>Recommended semester:</b> 6.	
<b>Educational level:</b> I.	
<b>Prerequisites:</b>	
<b>Recommended prerequisites:</b> 1-AIN-303 Game Engines	
<b>Course requirements:</b> Preliminary assessment: the project implementation The indicative evaluation scale : A 90%, B 80%, C 70%, D 60%, E 50% Scale of assessment (preliminary/final): The scale of assessment (preliminary/final): 100/0	
<b>Learning outcomes:</b> students will gain advanced experience working with game environments and among game developers of various professions (graphics, game designers).	
<b>Class syllabus:</b> Use of C ++ in the Ureal Engine environment . Linking Blueprint code with C ++ code . Comparison of game environments Unity, Unreal and others. Organization of a team of game developers. Ways of financing game creation. Types of games. Basic means of development of these types of games. Implementation of game mechanics such as dialogues, inventories, skill trees, crafting, game tasks, interactive tutorials. Using design patterns in games . Advanced player interaction with the game, the use of touch input devices, gamepads, game steering wheels, joysticks, devices for tracking the player's head position and gaze direction. Solving specific problems when developing your own game project . Using external means for creating shaders, 3d models and animation. Tuning, profiling games. Automated game testing. Customization and export of games for PC, mobile and TV-connected platforms.	
<b>Recommended literature:</b> Official Unreal Engine technology documentation. Own electronic texts. 3D game engine design : A practical approach to Real-Time computer graphics / David H. Eberly. Amsterdam: Elsevier, 2007 Real-time rendering / Tomas Akenine - Möller , Eric Haines, Naty Hoffman. Wellesley : AK Peters, 2008	

<b>Languages necessary to complete the course:</b> Slovak, English					
<b>Notes:</b>					
<b>Past grade distribution</b> Total number of evaluated students: 37					
A	B	C	D	E	FX
72,97	8,11	8,11	5,41	0,0	5,41
<b>Lecturers:</b> Ing. Alexander Šimko, PhD.					
<b>Last change:</b> 02.09.2024					
<b>Approved by:</b> doc. RNDr. Damas Gruska, PhD.					

## COURSE DESCRIPTION

<b>Academic year:</b> 2025/2026					
<b>University:</b> Comenius University Bratislava					
<b>Faculty:</b> Faculty of Mathematics, Physics and Informatics					
<b>Course ID:</b> FMFI.KJP/1-MXX-151/00		<b>Course title:</b> German Language (1)			
<b>Educational activities:</b> <b>Type of activities:</b> practicals <b>Number of hours:</b> <b>per week: 2 per level/semester: 26</b> <b>Form of the course:</b> on-site learning					
<b>Number of credits:</b> 2					
<b>Recommended semester:</b> 1.					
<b>Educational level:</b> I., I.II., II.					
<b>Prerequisites:</b>					
<b>Course requirements:</b> Scale of assessment (preliminary/final): 100/0					
<b>Learning outcomes:</b> 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 )					
<b>Class syllabus:</b> 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 )					
<b>Recommended literature:</b> Appropriate study material is supplied by teacher based on the participants'level of German proficiency.					
<b>Languages necessary to complete the course:</b>					
<b>Notes:</b>					
<b>Past grade distribution</b> Total number of evaluated students: 828					
A	B	C	D	E	FX
37,56	25,48	18,6	9,18	2,78	6,4
<b>Lecturers:</b> Mgr. Alexandra Maďarová, Mgr. Simona Dobiašová, PhD.					
<b>Last change:</b> 21.06.2022					
<b>Approved by:</b> doc. RNDr. Damas Gruska, PhD.					

## COURSE DESCRIPTION

<b>Academic year:</b> 2025/2026					
<b>University:</b> Comenius University Bratislava					
<b>Faculty:</b> Faculty of Mathematics, Physics and Informatics					
<b>Course ID:</b> FMFI.KJP/1-MXX-152/00		<b>Course title:</b> German Language (2)			
<b>Educational activities:</b> <b>Type of activities:</b> practicals <b>Number of hours:</b> <b>per week: 2 per level/semester: 26</b> <b>Form of the course:</b> on-site learning					
<b>Number of credits:</b> 2					
<b>Recommended semester:</b> 2.					
<b>Educational level:</b> I., I.II., II.					
<b>Prerequisites:</b>					
<b>Course requirements:</b> Scale of assessment (preliminary/final): 100/0					
<b>Learning outcomes:</b> 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 )					
<b>Class syllabus:</b> 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 )					
<b>Recommended literature:</b> Appropriate study material is supplied by teacher based on the participants’level of German proficiency					
<b>Languages necessary to complete the course:</b>					
<b>Notes:</b>					
<b>Past grade distribution</b> Total number of evaluated students: 541					
A	B	C	D	E	FX
37,89	19,59	19,59	12,38	3,51	7,02
<b>Lecturers:</b> Mgr. Alexandra Maďarová, Mgr. Simona Dobiašová, PhD.					
<b>Last change:</b> 21.06.2022					
<b>Approved by:</b> doc. RNDr. Damas Gruska, PhD.					

## COURSE DESCRIPTION

<b>Academic year:</b> 2025/2026					
<b>University:</b> Comenius University Bratislava					
<b>Faculty:</b> Faculty of Mathematics, Physics and Informatics					
<b>Course ID:</b> FMFI.KJP/1-MXX-251/00		<b>Course title:</b> German Language (3)			
<b>Educational activities:</b> <b>Type of activities:</b> practicals <b>Number of hours:</b> <b>per week:</b> 2 <b>per level/semester:</b> 26 <b>Form of the course:</b> on-site learning					
<b>Number of credits:</b> 2					
<b>Recommended semester:</b> 3.					
<b>Educational level:</b> I., I.II., II.					
<b>Prerequisites:</b>					
<b>Course requirements:</b> Scale of assessment (preliminary/final): 100/0					
<b>Learning outcomes:</b> Master the basics of general language and basic professional terminology of individual fields of study (depending on the advanced level of students)					
<b>Class syllabus:</b> 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).					
<b>Recommended literature:</b> Appropriate study material is supplied by teacher based on the participants' level of German proficiency.					
<b>Languages necessary to complete the course:</b>					
<b>Notes:</b>					
<b>Past grade distribution</b> Total number of evaluated students: 184					
A	B	C	D	E	FX
44,02	23,91	20,11	6,52	2,17	3,26
<b>Lecturers:</b> Mgr. Alexandra Maďarová, Mgr. Simona Dobiašová, PhD.					
<b>Last change:</b> 21.06.2022					
<b>Approved by:</b> doc. RNDr. Damas Gruska, PhD.					

## COURSE DESCRIPTION

<b>Academic year:</b> 2025/2026					
<b>University:</b> Comenius University Bratislava					
<b>Faculty:</b> Faculty of Mathematics, Physics and Informatics					
<b>Course ID:</b> FMFI.KJP/1-MXX-252/00		<b>Course title:</b> German Language (4)			
<b>Educational activities:</b> <b>Type of activities:</b> practicals <b>Number of hours:</b> <b>per week: 2 per level/semester: 26</b> <b>Form of the course:</b> on-site learning					
<b>Number of credits:</b> 2					
<b>Recommended semester:</b> 4.					
<b>Educational level:</b> I., I.II., II.					
<b>Prerequisites:</b>					
<b>Course requirements:</b> Scale of assessment (preliminary/final): 100/0					
<b>Learning outcomes:</b> Master the basics of general language and basic professional terminology of individual fields of study (depending on the advanced level of students)					
<b>Class syllabus:</b> 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).					
<b>Recommended literature:</b> Appropriate study material is supplied by teacher based on the participants' level of German proficiency.					
<b>Languages necessary to complete the course:</b>					
<b>Notes:</b>					
<b>Past grade distribution</b> Total number of evaluated students: 104					
A	B	C	D	E	FX
44,23	22,12	14,42	10,58	3,85	4,81
<b>Lecturers:</b> Mgr. Alexandra Maďarová, Mgr. Simona Dobiašová, PhD.					
<b>Last change:</b> 21.06.2022					
<b>Approved by:</b> doc. RNDr. Damas Gruska, PhD.					

## COURSE DESCRIPTION

<b>Academic year:</b> 2025/2026	
<b>University:</b> Comenius University Bratislava	
<b>Faculty:</b> Faculty of Mathematics, Physics and Informatics	
<b>Course ID:</b> FMFI.KI/2-INF-174/15	<b>Course title:</b> Graph Theory
<b>Educational activities:</b> <b>Type of activities:</b> lecture / practicals <b>Number of hours:</b> <b>per week:</b> 3 / 1 <b>per level/semester:</b> 39 / 13 <b>Form of the course:</b> on-site learning	
<b>Number of credits:</b> 6	
<b>Recommended semester:</b> 5.	
<b>Educational level:</b> I., II.	
<b>Prerequisites:</b>	
<b>Recommended prerequisites:</b> 1-INF-160 Introduction to combinatorics and graph theory	
<b>Course requirements:</b> Approximate scale of evaluation: A 90%, B 80%, C 70%, D 60%, E 50% Scale of assessment (preliminary/final): 20/80 maximum 20% of evaluation can be obtain by solving homeworks	
<b>Learning outcomes:</b> The course will provide students with solid foundations of graph theory by proving key classical theorems and explaining the most important graph algorithms. Emphasis is also placed on motivation from other scientific disciplines and technology and possible applications of the covered topics.	
<b>Class syllabus:</b> Basic terminology: trees, bipartite graphs, graph and labyrinth search. Eulerian graphs. matchings in graphs, König's theorem, Hall theorem and its corollaries. measuring of graph connectivity. Menger's theorem, Planar graphs, Euler's theorem. Kuratowski's theorem. Graph coloring: some NP-hard problems, greedy algorithm. Brooks' theorem. Vizing's theorem. Coloring of planar graphs. Flows, Ford–Fulkerson algorithm and its applications. Integer and group flows, relationship to coloring. Hamiltonian graphs. Chvátal's theorem. Random graphs, probabilistic models, properties of random graphs.	
<b>Recommended literature:</b>	
<b>Languages necessary to complete the course:</b> Slovak, English.	
<b>Notes:</b>	



<b>Past grade distribution</b>					
Total number of evaluated students: 156					
A	B	C	D	E	FX
39,74	18,59	16,03	10,26	10,26	5,13
<b>Lecturers:</b> doc. RNDr. Edita Mačajová, PhD.					
<b>Last change:</b> 28.06.2022					
<b>Approved by:</b> doc. RNDr. Damas Gruska, PhD.					

## COURSE DESCRIPTION

<b>Academic year:</b> 2025/2026	
<b>University:</b> Comenius University Bratislava	
<b>Faculty:</b> Faculty of Mathematics, Physics and Informatics	
<b>Course ID:</b> FMFI.KAI/1-AIN-413/22	<b>Course title:</b> Graphs, Graphic Algorithms and Optimization
<b>Educational activities:</b> <b>Type of activities:</b> course <b>Number of hours:</b> <b>per week:</b> 4 <b>per level/semester:</b> 52 <b>Form of the course:</b> on-site learning	
<b>Number of credits:</b> 6	
<b>Recommended semester:</b> 3.	
<b>Educational level:</b> I.	
<b>Prerequisites:</b>	
<b>Recommended prerequisites:</b> 1-AIN-160/15 Discrete Mathematics 2	
<b>Antirequisites:</b> FMFI.KAI/1-AIN-413/15	
<b>Course requirements:</b> Continuous assessment: graded homework, quizzes, activity at recitations, tests. The student must obtain at least 55% of points from the semester in order to take the final exam. Examination: an examination consisting of a written and an oral part. The student must obtain at least 50% of the points from the written part. Approximate scale: A 90%, B 80%, C 70%, D 60%, E 55% Scale of assessment (preliminary/final): 50/50	
<b>Learning outcomes:</b> After completing the course, students will master the basic concepts of graph theory, several important graph algorithms and optimization algorithms and will be able to do a complex analysis of these algorithms.	
<b>Class syllabus:</b> Basic concepts in graph theory, examples, properties, representation of graphs in a computer, Isomorphism of graphs Significant graph classes, trees Important graph algorithms for searching graphs, finding the optimal spanning tree of a graph, finding the shortest path in a graph, the problem of a business traveler, analysis of these algorithms Matching and flow in networks; Hall's theorem Practical implementation of some algorithms	
<b>Recommended literature:</b> Introduction to Algorithms, 3rd Edition/ T. H. Cormen, C. E. Leiserson, R. L. Rivest, C. Stein. MIT Press (2009) Modern graph theory / Béla Bollobás. New York : Springer, 1998 Graph theory / Reinhard Diestel. Berlin : Springer, 2005	

Lineárne programovanie / Ján Plesník, Jitka Dupačová, Milan Vlach. Bratislava : Alfa, 1990 Vlastné elektronické texty vyučujúceho predmetu zverejňované prostredníctvom web stránky predmetu. Linear programming/ V. Chvátal Zbierka príkladov z grafov a optimalizácie/T.Jajcayová, P. Náther - electronic text					
<b>Languages necessary to complete the course:</b> Slovak, English					
<b>Notes:</b>					
<b>Past grade distribution</b> Total number of evaluated students: 89					
A	B	C	D	E	FX
25,84	25,84	15,73	14,61	5,62	12,36
<b>Lecturers:</b> doc. RNDr. Tatiana Jajcayová, PhD., Mgr. Peter Náther, PhD.					
<b>Last change:</b> 26.06.2022					
<b>Approved by:</b> doc. RNDr. Damas Gruska, PhD.					

## COURSE DESCRIPTION

<b>Academic year:</b> 2025/2026	
<b>University:</b> Comenius University Bratislava	
<b>Faculty:</b> Faculty of Mathematics, Physics and Informatics	
<b>Course ID:</b> FMFI.KAI/1-MXX-491/22	<b>Course title:</b> Inclusive Approaches to Education of Students with Special Educational Needs
<b>Educational activities:</b> <b>Type of activities:</b> seminar <b>Number of hours:</b> <b>per week:</b> 2 <b>per level/semester:</b> 26 <b>Form of the course:</b> on-site learning	
<b>Number of credits:</b> 2	
<b>Recommended semester:</b> 1., 3.	
<b>Educational level:</b> I., I.II.	
<b>Prerequisites:</b>	
<b>Course requirements:</b> 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	
<b>Learning outcomes:</b> The student: <ul style="list-style-type: none"> <li>- They will get acquainted with the basic characteristics of types of health disadvantage (HR) and will know the consequences of HR on education.</li> <li>- Gain personal experience from meetings with people with disabilities and will be able to explain and apply the rules of communication with them.</li> <li>- 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.</li> </ul>	
<b>Class syllabus:</b> <ul style="list-style-type: none"> <li>- Characteristics of basic concepts.</li> <li>- Disability models.</li> <li>- Disability legislation.</li> <li>- Human, communication, information and architectural barriers.</li> <li>- Impact of disability on education.</li> <li>- Segregation - integration - inclusion.</li> <li>- Information access technologies for people with disabilities.</li> <li>- Possibilities and limits of creating equal conditions for the education of pupils with specific educational needs.</li> <li>- Inclusive school - education for all.</li> <li>- The importance of education for the social inclusion of people with disabilities.</li> </ul>	
<b>Recommended literature:</b>	

- 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. Damas Gruska, PhD.

## COURSE DESCRIPTION

<b>Academic year:</b> 2025/2026	
<b>University:</b> Comenius University Bratislava	
<b>Faculty:</b> Faculty of Mathematics, Physics and Informatics	
<b>Course ID:</b> FMFI.KAI/1-AIN-414/25	<b>Course title:</b> Information Systems in Public Administration
<b>Educational activities:</b> <b>Type of activities:</b> lecture / practicals <b>Number of hours:</b> <b>per week:</b> 2 / 2 <b>per level/semester:</b> 26 / 26 <b>Form of the course:</b> on-site learning	
<b>Number of credits:</b> 3	
<b>Recommended semester:</b> 3.	
<b>Educational level:</b> I.	
<b>Prerequisites:</b>	
<b>Recommended prerequisites:</b> N/A	
<b>Course requirements:</b> (50 %) Active participation in seminars / (50 %) Analysis of existing ISVS in the form of presentations Scale of assessment (preliminary/final): 50/50	
<b>Learning outcomes:</b> Upon completing the course, the student will be able to understand the architecture, operation, and societal significance of information systems in public administration (ISVS). They will gain an overview of the data, technical, and legal aspects of these systems, learn to identify key stakeholders, and assess the impact of ISVS on citizens and state institutions. The student will be able to analyze ISVS in terms of data quality, security, digital sovereignty, user accessibility, and long-term sustainability.	
<b>Class syllabus:</b> <ol style="list-style-type: none"> <li>1. Data and Data Authorities in Public Administration</li> <li>2. Information Systems in Public Administration: Definition and Specifics</li> <li>3. Architecture and Modularity of Public Sector Information Systems</li> <li>4. Information as a Public Output: Clarity, Dignity, Accessibility</li> <li>5. Data Integration and Sharing</li> <li>6. Infrastructure and Cloud Strategies</li> <li>7. IS Security and Critical Infrastructure</li> <li>8. Digital Sovereignty and the Global IT Environment</li> <li>9. Open Technologies and Public Sector Innovation</li> <li>10. People, Processes, and Decision-Making in ISVS</li> <li>11. Stakeholders and Impact: ISVS as Social Infrastructure</li> <li>12. The Future of ISVS and Digital Transformation</li> </ol>	
<b>Recommended literature:</b>	

<p>Bannister, F., Connolly, R. (2014). ICT, public values and transformative government: A framework and programme for research. <i>Government Information Quarterly</i>, 31(1), 119–128.</p> <p>Janssen, M., Charalabidis, Y., Zuiderwijk, A. (2012). Benefits, adoption barriers and myths of open data and open government. <i>Information Systems Management</i>, 29(4), 258–268.</p> <p>Regulacká, M. (2010). <i>Vývoj IS vo verejnej správe – integračné architektúry, globálna architektúra ISVS</i>. Bratislava: BRM.</p> <p>Zákon č. 211/2000 Z. z. o slobodnom prístupe k informáciám (tzv. infozákon)</p> <p>Zákon č. 305/2013 Z. z. o elektronickej podobe výkonu pôsobnosti orgánov verejnej moci (zákon o e-Governmente)</p> <p>Zákon č. 95/2019 Z. z. o informačných technológiách vo verejnej správe</p> <p>Zákon č. 177/2018 Z. z. o údajoch (tzv. zákon proti byrokracii)</p> <p>Zákon č. 69/2018 Z. z. o kybernetickej bezpečnosti</p>																	
<p><b>Languages necessary to complete the course:</b> slovak, english (because of some pieces of recommended literature)</p>																	
<p><b>Notes:</b></p>																	
<p><b>Past grade distribution</b> Total number of evaluated students: 0</p> <table border="1"> <tr> <th>A</th><th>B</th><th>C</th><th>D</th><th>E</th><th>FX</th></tr> <tr> <td>0,0</td><td>0,0</td><td>0,0</td><td>0,0</td><td>0,0</td><td>0,0</td></tr> </table>						A	B	C	D	E	FX	0,0	0,0	0,0	0,0	0,0	0,0
A	B	C	D	E	FX												
0,0	0,0	0,0	0,0	0,0	0,0												
<p><b>Lecturers:</b> PhDr. Ing. Tomáš Gál, PhD.</p>																	
<p><b>Last change:</b> 25.07.2025</p>																	
<p><b>Approved by:</b> doc. RNDr. Damas Gruska, PhD.</p>																	

## COURSE DESCRIPTION

<b>Academic year:</b> 2025/2026	
<b>University:</b> Comenius University Bratislava	
<b>Faculty:</b> Faculty of Mathematics, Physics and Informatics	
<b>Course ID:</b> FMFI.KAI/1-AIN-317/23	<b>Course title:</b> Internet, AI & Society
<b>Educational activities:</b> <b>Type of activities:</b> seminar <b>Number of hours:</b> <b>per week: 2 per level/semester: 26</b> <b>Form of the course:</b> on-site learning	
<b>Type, volume, methods and workload of the student - additional information</b> Course based on lectures, discussions, writing short essays, making some tasks, preparing and presenting final short presentations.	
<b>Number of credits:</b> 3	
<b>Recommended semester:</b> 4., 6.	
<b>Educational level:</b> I.	
<b>Prerequisites:</b>	
<b>Course requirements:</b> During the semester: Active seminar participation, short essays and tasks At the end: Final presentation Evaluation: Continuous evaluation: short essays and tasks (50%), final presentation (50%) Final grade: A 90%, B 80%, C 70%, D 60%, E 50% Scale of assessment (preliminary/final): 50/50	
<b>Learning outcomes:</b> Students will be able to think and discuss deep changes, that brought first internet and later artificial intelligence into global human society. There will be able to discussed societal, psychological, social, economic and philosophical impacts on today society.	
<b>Class syllabus:</b> Brief history of information, Internet society and their changes. Grow and decline of collective intelligence, social bubbles. Scale free network of internet, memetics. Artificial intelligence and internet. Complicated relations of states and internet. Social control, elections. Copyright, laws, reality, time. Subjectivity of the truth, fake news. AI and art.	
<b>Recommended literature:</b> Susskind, Jamie, The Digital Republic, On Freedom and Democracy in the 21st Century, Bloomsbury Publishing, 2022, Bergstrom, Carl T., West, Jevin D., Calling Bullshit, The Art of Skepticism in a Data-Driven, World, Random House, New York, 2020, Graham, Mark, Dutton, William H., Society & The Internet, How Networks of information and Communication are Changing Our Lives, Oxford University Press, 2019 Singer, P.W., Brooking, Emerson T., LikeWar, The Weaponization of Social Media, Eamon Dolan/Houghton Mifflin Harcourt, 2018 Stephens-Davidowitz, Seth, Everybody Lies: Big Data, New Data, and What the Internet Can Tell Us About Who We Really Are, Dey Street Books, 2017	



O'Neil, Cathy, Weapons of math destruction: How big data increases inequality and threatens democracy, Crown Publishing Group, Penguin Random House, UK, 2016  
 Pariser, Eli, The Filter Bubble, What the Internet is Hiding from You, Viking, Penguin Books, London, 2011  
 Barabási, Albert-László, V pavučine síti, Paseka, Praha, 2005  
 Blackmoreová, Susan, The Meme Machine, Oxford University Press, 1999

**Languages necessary to complete the course:**

Slovak, English

**Notes:**

**Past grade distribution**

Total number of evaluated students: 65

A	B	C	D	E	FX
86,15	3,08	1,54	1,54	0,0	7,69

**Lecturers:** Ing. František Gyarfaš, CSc., doc. RNDr. Martin Takáč, PhD.

**Last change:** 21.07.2025

**Approved by:** doc. RNDr. Damas Gruska, PhD.

## COURSE DESCRIPTION

<b>Academic year:</b> 2025/2026	
<b>University:</b> Comenius University Bratislava	
<b>Faculty:</b> Faculty of Mathematics, Physics and Informatics	
<b>Course ID:</b> FMFI.KAI/1-AIN-304/22	<b>Course title:</b> Introduction to Artificial Intelligence
<b>Educational activities:</b> <b>Type of activities:</b> lecture / practicals <b>Number of hours:</b> <b>per week:</b> 2 / 2 <b>per level/semester:</b> 26 / 26 <b>Form of the course:</b> on-site learning	
<b>Number of credits:</b> 6	
<b>Recommended semester:</b> 5.	
<b>Educational level:</b> I.	
<b>Prerequisites:</b>	
<b>Course requirements:</b> The course assessment consists of three parts: exercises (30%), project (20%) and final exam (50%). Student should get at least half marks from exercises and project, respectively, in order to meet the minimal condition to sit the final written exam. Grading: A (100-91), B (90-81), C (80-71), D (70-61), E (60-51), Fx (50-0). Scale of assessment (preliminary/final): Practical work 50% (30% exercises + 20% project) / 50% final exam.	
<b>Learning outcomes:</b> The course covers the basics of symbolic and nature-inspired methods of artificial intelligence. The objective is to provide the students with insight into the area of problem-solving by means of Artificial Intelligence. Theory is combined with practical exercises. Gained knowledge and skills can be further extended in the related master programmes.	
<b>Class syllabus:</b> In the first half of the course, we provide the description of simple rational agents, logical agents, uninformed and informed search in the solution space, the basics of game theory, problems with restrictive conditions, optimization, more complex agents capable of inference including the propositional logic and inference using the knowledge base. In the second half of the course, we tackle learning from examples: supervised learning, classification and regression, multilayer feedforward neural network and its applications, model selection, generalization, unsupervised learning and self-organization. We also introduce some nonparametric models, like K-means clustering and K-nearest neighbour method.	
<b>Recommended literature:</b> [1] Russell, Stuart and Norvig, Peter: Artificial Intelligence: A Modern Approach (3rd Edition), Prentice Hall, USA, 2010. [2] Návrát, Pavol a kol.: Umelá inteligencia (3. vydanie), Vydavateľstvo STU, Bratislava, 2015.	
<b>Languages necessary to complete the course:</b> English, Slovak	

<b>Notes:</b>					
<b>Past grade distribution</b>					
Total number of evaluated students: 254					
A	B	C	D	E	FX
17,32	18,9	22,44	19,29	9,45	12,6
<b>Lecturers:</b> prof. RNDr. Ľubica Beňušková, PhD., doc. RNDr. Mária Markošová, PhD., Mgr. Iveta Bečková, PhD.					
<b>Last change:</b> 15.03.2022					
<b>Approved by:</b> doc. RNDr. Damas Gruska, PhD.					

## COURSE DESCRIPTION

<b>Academic year:</b> 2025/2026	
<b>University:</b> Comenius University Bratislava	
<b>Faculty:</b> Faculty of Mathematics, Physics and Informatics	
<b>Course ID:</b> FMFI.KI/1-INF-520/00	<b>Course title:</b> Introduction to Information Security
<b>Educational activities:</b> <b>Type of activities:</b> lecture <b>Number of hours:</b> <b>per week:</b> 3 <b>per level/semester:</b> 39 <b>Form of the course:</b> on-site learning	
<b>Number of credits:</b> 4	
<b>Recommended semester:</b> 6.	
<b>Educational level:</b> I.	
<b>Prerequisites:</b>	
<b>Course requirements:</b> Final exam, A 90%, B 80%, C 70%, D 60%, E 50% Scale of assessment (preliminary/final): 0/100	
<b>Learning outcomes:</b> The course provides an overview of information security, legal requirements for data protection and systems, threats and measures to eliminate the risks that arise from them. The student knows the classification of data, the method of risk analysis, the content of a security policy, the method of developing a security project as well as the basic standards and recommended procedures in the field of information security.	
<b>Class syllabus:</b> The role of information security. The major security attributes of information (confidentiality, availability, authenticity, integrity, privacy, etc.) Basic notions of information security (system, asset, threat, vulnerability, risk). Building a new or securing an existing IT system. Security projects (description of the system and of its environment, identification of relevant threats, qualitative risk analysis, contrameasures). Risk management (incident handling, disaster recovery, business continuity planning). Management of information security. Evaluation and certification of IT system/product. Introduction to cryptology and PKI.	
<b>Recommended literature:</b> 1. Cybersecurity Body of Knowledge Resources & Publications (cybok.org) 2. NIST SP 800 series NIST Special Publication 800-series General Information NIST 3. BSI Štandardy BSI - IT-Grundschtz (bund.de) 4. SO/IEC 27001 — Information security management systems — Requirements. 5. ISO/IEC 27002 — Code of practice for information security management. 6. ISO/IEC 27005 — Information security risk management. 7. Zákon č. 69/2018 Z. z. o kybernetickej bezpečnosti a o zmene a doplnení niektorých zákonov	

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

**Languages necessary to complete the course:**

Slovak, English

**Notes:**

**Past grade distribution**

Total number of evaluated students: 1120

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

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

**Last change:** 15.03.2022

**Approved by:** doc. RNDr. Damas Gruska, PhD.

## COURSE DESCRIPTION

<b>Academic year:</b> 2025/2026	
<b>University:</b> Comenius University Bratislava	
<b>Faculty:</b> Faculty of Mathematics, Physics and Informatics	
<b>Course ID:</b> FMFI.KAI+KDMFI/1- AIN-211/22	<b>Course title:</b> Introduction to Theoretical Informatics
<b>Educational activities:</b> <b>Type of activities:</b> lecture / practicals <b>Number of hours:</b> <b>per week:</b> 2 / 2 <b>per level/semester:</b> 26 / 26 <b>Form of the course:</b> on-site learning	
<b>Number of credits:</b> 6	
<b>Recommended semester:</b> 4.	
<b>Educational level:</b> I.	
<b>Prerequisites:</b> FMFI.KAI/1-AIN-121/22 - Discrete Mathematics (1) and FMFI.KAI+KDMFI/1-AIN-170/22 - Programming (2)	
<b>Antirequisites:</b> FMFI.KI/1-INF-215/00	
<b>Course requirements:</b> Continuous assessment: papers Examination: written-oral examination Indicative assessment scale: A 90%, B 80%, C 70%, D 60%, E 50%	
<b>Learning outcomes:</b> Introduction to theoretical computer science, to acquaint with classical and current areas of research, in which there are basic questions: Can all problems be solved algorithmically? How effective is the solution? What are the solution techniques? After completing the course, students will know the formal definition of the computational model (deterministic finite state machine, Turing machine and their nondeterministic variants), they will be able to prove that their proposed KA is the correct solution required by the assignment, or that the KA that solves the given problem does not exist. They will be able to modularly design KA and systematically also TS. The end of the course introduces the basics of computability and the method of problem reduction.	
<b>Class syllabus:</b> Brief introduction to the main areas of theoretical computer science: - Alphabets, Words, Languages and algorithmic problems - Finite machines - Turing machines - Computability (introduction)	
<b>Recommended literature:</b>	
<b>Languages necessary to complete the course:</b>	
<b>Notes:</b>	

<b>Past grade distribution</b>					
Total number of evaluated students: 1122					
A	B	C	D	E	FX
6,77	13,73	16,67	21,3	27,18	14,35
<b>Lecturers:</b> doc. RNDr. Damas Gruska, PhD., RNDr. Michal Winczer, PhD., doc. Mgr. Tomáš Vinař, PhD., doc. RNDr. Dana Pardubská, CSc.					
<b>Last change:</b> 14.03.2022					
<b>Approved by:</b> doc. RNDr. Damas Gruska, PhD.					

## COURSE DESCRIPTION

<b>Academic year:</b> 2025/2026	
<b>University:</b> Comenius University Bratislava	
<b>Faculty:</b> Faculty of Mathematics, Physics and Informatics	
<b>Course ID:</b> FMFI.KDMFI/1-AIN-112/22	<b>Course title:</b> Introduction to Web Technologies
<b>Educational activities:</b> <b>Type of activities:</b> lecture / practicals <b>Number of hours:</b> <b>per week:</b> 2 / 2 <b>per level/semester:</b> 26 / 26 <b>Form of the course:</b> on-site learning	
<b>Number of credits:</b> 6	
<b>Recommended semester:</b> 1.	
<b>Educational level:</b> I.	
<b>Prerequisites:</b>	
<b>Antirequisites:</b> FMFI.KZVI/1-AIN-610/00	
<b>Course requirements:</b> Intermediate assessment: practical assignments Exam: practical (at least 70% of the semester points are needed) Indicative evaluation scale: A 90%, B 80%, C 70%, D 60%, E 50% Scale of assessment (preliminary/final): 20/80	
<b>Learning outcomes:</b> After completing the course, students will be able to create a correct web page (in HTML) with the correct structure and correctly formatted content. The design will be implemented using CSS and will be adapted to different devices (using MediaQueries or CSS framework). The pages will fulfil the basic conditions of accessibility for people with special needs. Students will be introduced to the basics of JavaScript, which will allow them to work with HTML elements, edit CSS and work with forms.	
<b>Class syllabus:</b> - HTML: document structuring, content formatting elements, basic page elements including multimedia objects, code validation, tables, forms and their appropriate structuring. - Cascading Style Sheets (CSS): properties and their values, selectors, pseudo-classes, properties for formatting fonts and text, tables and other objects, colors, backgrounds, lengths, units, box model, object placement, visual document formatting, styles for different devices, Media Queries, other CSS options with respect to current versions. - Introduction to CSS frameworks, e.g. Bootstrap + responsive pages. - Basic information on website accessibility.	
<b>Recommended literature:</b> actual documentation for each technology w3schools.com own electronic texts published on the website or in the Moodle environment	
<b>Languages necessary to complete the course:</b>	



Slovak, English					
<b>Notes:</b>					
<b>Past grade distribution</b>					
Total number of evaluated students: 1531					
A	B	C	D	E	FX
32,01	11,37	11,63	13,65	12,15	19,2
<b>Lecturers:</b> PaedDr. Roman Hrušecký, PhD.					
<b>Last change:</b> 21.06.2022					
<b>Approved by:</b> doc. RNDr. Damas Gruska, PhD.					

## COURSE DESCRIPTION

<b>Academic year:</b> 2025/2026	
<b>University:</b> Comenius University Bratislava	
<b>Faculty:</b> Faculty of Mathematics, Physics and Informatics	
<b>Course ID:</b> FMFI.KAG/1-AIN-545/22	<b>Course title:</b> Introduction to geometric modeling
<b>Educational activities:</b> <b>Type of activities:</b> course <b>Number of hours:</b> <b>per week:</b> 4 <b>per level/semester:</b> 52 <b>Form of the course:</b> on-site learning	
<b>Number of credits:</b> 4	
<b>Recommended semester:</b> 6.	
<b>Educational level:</b> I.	
<b>Prerequisites:</b>	
<b>Course requirements:</b> For the semester, the student can get 50% for exercises and 50% for the final exam. The student must obtain at least half of the points for the exercises in order to pass to the final exam. During the semester, the student can obtain 37.50% for programming assignments and 12.5% for written homework assignments, there is no minimal requirement for homework assignments. The final exam consists of a written (40%) and an oral part (10%). If the student does not get half of the points for the written part of the final exam, he / she is not admitted to the oral part and the grade is Fx. Upon successful completion of the written part of the exam, participation in the oral part of the final exam is voluntary. Grading: A (100-91), B (90-81), C (80-71), D (70-61), E (60-51), Fx (50-0). Scale of assessment (preliminary/final): Preliminary assessment 50% (37.50% programming assignments + 12.5% written homework assignments) / 50% final exam (40% written part + 10% oral part).	
<b>Learning outcomes:</b> The course graduate gains basic knowledge of the cubic curve segments, spline curves, patches and spline surfaces. Spline curves and surfaces are studied with parametric or geometric continuities, the shape parameters are applied for modeling. The computational algorithms of the curve segments are presented.	
<b>Class syllabus:</b> <ol style="list-style-type: none"> <li>Representation of cubic segments in Hermite and Bernstein basis, computational algorithms.</li> <li>Geometric and parametric continuities for curve segments and creating:           <ol style="list-style-type: none"> <li>interpolating splines (Hermite spline, cardinal spline, Catmull-Rom spline)</li> <li>approximating splines (Bézier spline, Beta spline, B-spline).</li> </ol>           Rational curves (Bézier, NURBS) and the weights as shape parameters.         </li> <li>Representation of surfaces defined by           <ol style="list-style-type: none"> <li>geometric transformation (surfaces of revolution)</li> <li>boundary curves (ruled surfaces, Coons surfaces)</li> <li>control nets (tensor-product surfaces, Bézier, B-spline, NURBS).</li> </ol> </li> </ol>	

**Recommended literature:**

Geometric Modeling with Splines / R. F. Riesenfeld, E. Cohen, G. Elber: A K Peters/CRC Press; 1 ed. 2001

Fundamentals of CAGD / J. Hoschek, D. Lasser: A K Peters/CRC Press; 1 ed., 1996

Geometric Concepts for Geometric Design / W. Boehm, H. Prautzsch. Publ. by A K PETERS, 1993

Bézier and B-Spline Techniques / H. Prautzsch, W. Boehm, M. Paluszny. Springer-Verlag Berlin Heidelberg, 2002

Curves and Surfaces for CAGD, Fifth Edition: A Practical Guide / Gerald Farin. Morgan-Kaufmann, 2002

**Languages necessary to complete the course:**

english

**Notes:****Past grade distribution**

Total number of evaluated students: 89

A	B	C	D	E	FX
16,85	15,73	13,48	25,84	15,73	12,36

**Lecturers:** RNDr. Martina Bátorová, PhD., Mgr. Marcel Makovník, PhD.

**Last change:** 20.06.2022

**Approved by:** doc. RNDr. Damas Gruska, PhD.

## COURSE DESCRIPTION

<b>Academic year:</b> 2025/2026					
<b>University:</b> Comenius University Bratislava					
<b>Faculty:</b> Faculty of Mathematics, Physics and Informatics					
<b>Course ID:</b> FMFI.KAI/1-AIN-406/22		<b>Course title:</b> Language and Cognition			
<b>Educational activities:</b> <b>Type of activities:</b> course <b>Number of hours:</b> <b>per week:</b> 2 <b>per level/semester:</b> 26 <b>Form of the course:</b> on-site learning					
<b>Number of credits:</b> 3					
<b>Recommended semester:</b> 2., 4., 6.					
<b>Educational level:</b> I., I.II.					
<b>Prerequisites:</b>					
<b>Course requirements:</b> 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					
<b>Learning outcomes:</b> Acquisition of the most important current theories and methods of studying natural language and cognitive processes.					
<b>Class syllabus:</b> 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.					
<b>Recommended literature:</b> G. Dorren: Babel. Around the World in 20 Languages. Profile Books, 2019 S. Pinker: Language Instinct. †Brilliance Audio, 2014 S. Pinker: The Stuff of Thought. Language as a Window Into Human Nature. Penguin Books 2008 S. Pinker: Words and Rules. The Ingredients of Language. Basic Books 2015					
<b>Languages necessary to complete the course:</b> Slovak, English					
<b>Notes:</b>					
<b>Past grade distribution</b> Total number of evaluated students: 172					
A	B	C	D	E	FX
37,21	23,84	15,12	11,05	5,23	7,56
<b>Lecturers:</b> doc. PhDr. Ján Rybár, PhD.					

<b>Last change:</b> 17.05.2024
<b>Approved by:</b> doc. RNDr. Damas Gruska, PhD.

## COURSE DESCRIPTION

<b>Academic year:</b> 2025/2026	
<b>University:</b> Comenius University Bratislava	
<b>Faculty:</b> Faculty of Mathematics, Physics and Informatics	
<b>Course ID:</b> FMFI.KAG+KAI/1- AIN-152/22	<b>Course title:</b> Linear Algebra
<b>Educational activities:</b> <b>Type of activities:</b> lecture / practicals <b>Number of hours:</b> <b>per week:</b> 2 / 2 <b>per level/semester:</b> 26 / 26 <b>Form of the course:</b> on-site learning	
<b>Number of credits:</b> 6	
<b>Recommended semester:</b> 3., 5.	
<b>Educational level:</b> I.	
<b>Prerequisites:</b>	
<b>Course requirements:</b> Continuous assessment: graded homework, quizzes, activities in exercises, midterms. The student must obtain at least 55% of points from the semester in order to take the final exam. Examination: an examination consisting of a written and an oral part. The student must obtain at least 50% of the points from the written part. Approximate scale: A 90%, B 80%, C 70%, D 60%, E 55% Scale of assessment (preliminary/final): 50/50	
<b>Learning outcomes:</b> After completing the course, students will be familiar with the fundamentals of linear algebra needed in informatics and computer graphics.	
<b>Class syllabus:</b> Matrices and matrix operations, determinants. The concept of a group, specific matrix groups. Systems of linear equations. Solution spaces, vector spaces. Scalar product, vector product in 3-dimensional space. Linear and affine spaces. Eigenvectors and eigenvalues.	
<b>Recommended literature:</b> J. Korbáš: Lineárna algebra a geometria I J. Smítal, E. Gedeonová, S. Znam: Úvod do lineárnej algebry J. Smítal, E. Gedeonová: Lineárna Algebra P. Zlatos: Lineárna algebra a geometria Jim Hefferon: Linear Algebra Robert A. Beezer: A First Course in Linear Algebra Steven J. Leon: Linear Algebra with Applications, 9th Edition, Pearson Education	
<b>Languages necessary to complete the course:</b>	

Slovak, English					
<b>Notes:</b>					
<b>Past grade distribution</b>					
Total number of evaluated students: 133					
A	B	C	D	E	FX
27,82	28,57	18,05	15,04	6,77	3,76
<b>Lecturers:</b> doc. RNDr. Tatiana Jajcayová, PhD., prof. RNDr. Róbert Jajcay, DrSc.					
<b>Last change:</b> 26.06.2022					
<b>Approved by:</b> doc. RNDr. Damas Gruska, PhD.					

## COURSE DESCRIPTION

<b>Academic year:</b> 2025/2026	
<b>University:</b> Comenius University Bratislava	
<b>Faculty:</b> Faculty of Mathematics, Physics and Informatics	
<b>Course ID:</b> FMFI.KAI/1-AIN-510/22	<b>Course title:</b> Linux - Principles and Means
<b>Educational activities:</b> <b>Type of activities:</b> lecture / practicals <b>Number of hours:</b> <b>per week:</b> 1 / 1 <b>per level/semester:</b> 13 / 13 <b>Form of the course:</b> on-site learning	
<b>Type, volume, methods and workload of the student - additional information</b> talk, 1h/week, online synchronous training, 2h/week, online synchronous	
<b>Number of credits:</b> 3	
<b>Recommended semester:</b> 3.	
<b>Educational level:</b> I.	
<b>Prerequisites:</b>	
<b>Recommended prerequisites:</b> 1-AIN-500 Linux for Users	
<b>Antirequisites:</b> FMFI.KAI/1-AIN-510/00	
<b>Course requirements:</b> Priebežné hodnotenie: practical computer exercises Skúška: practical computer exam Orientačná stupnica hodnotenia: A 92%, B 84%, C 76%, D 68%, E 60%	
<b>Learning outcomes:</b> Graduate: <ul style="list-style-type: none"> <li>- knows the principles of operation of the GNU/Linux operating system</li> <li>- knows and understands the basic principles of GNU/Linux OS components such as process, file system, user management, access rights, ...</li> <li>- recognizes and applies a set of commands according to administration-user scenarios</li> <li>- knows and understands the basics of the network model</li> <li>- applies encryption principles in GNU/Linux OS</li> <li>- creates a "oneline compound command" or script to solve an administrative-user task</li> <li>- creates a simple Makefile</li> </ul>	
<b>Class syllabus:</b> <ul style="list-style-type: none"> <li>- Virtual machine and package system</li> <li>- File system</li> <li>- Logical Volume Manager</li> <li>- Redundant Array of Inexpensive Disks (RAID)</li> <li>- File and directory rights system</li> <li>- Processes</li> <li>- Connecting computers and the Internet</li> </ul>	



<ul style="list-style-type: none"> <li>- TCP and UDP transport layer network model</li> <li>- Encryption, keys and ssh</li> <li>- System initialization</li> <li>- Apache and MariaDB</li> <li>- Compiling and GNU Make</li> </ul>					
<b>Recommended literature:</b>					
<b>Languages necessary to complete the course:</b>					
<b>Notes:</b> The tasks are solved in a specialized software tool, which also enables effective distance synchronous education.					
<b>Past grade distribution</b> Total number of evaluated students: 339					
A	B	C	D	E	FX
64,9	9,14	9,14	5,31	5,9	5,6
<b>Lecturers:</b> doc. RNDr. Dušan Guller, PhD., RNDr. Marek Nagy, PhD., Mgr. Ján Klůka, PhD.					
<b>Last change:</b> 20.06.2022					
<b>Approved by:</b> doc. RNDr. Damas Gruska, PhD.					

## COURSE DESCRIPTION

<b>Academic year:</b> 2025/2026	
<b>University:</b> Comenius University Bratislava	
<b>Faculty:</b> Faculty of Mathematics, Physics and Informatics	
<b>Course ID:</b> FMFI.KAI/1-AIN-500/22	<b>Course title:</b> Linux for Users
<b>Educational activities:</b> <b>Type of activities:</b> course <b>Number of hours:</b> <b>per week: 2 per level/semester: 26</b> <b>Form of the course:</b> on-site learning	
<b>Type, volume, methods and workload of the student - additional information</b> talk, 1h/week, online synchronous training, 2h/week, online synchronous	
<b>Number of credits:</b> 2	
<b>Recommended semester:</b> 2.	
<b>Educational level:</b> I.	
<b>Prerequisites:</b>	
<b>Course requirements:</b> Priebežné hodnotenie: practical computer exercises Skúška: practical computer exam Orientačná stupnica hodnotenia: A 92%, B 84%, C 76%, D 68%, E 60%	
<b>Learning outcomes:</b> Graduate: <ul style="list-style-type: none"> <li>- knows the principle and function of the command line</li> <li>- knows the principles of operation of the GNU/Linux operating system</li> <li>- knows and understands the basic components of the GNU/Linux OS such as process, file system, user administration, access rights, ...</li> <li>- recognizes and applies a set of commands according to scenarios</li> <li>- creates a "oneline compound command" or a simple script to solve task assignment</li> </ul>	
<b>Class syllabus:</b> <ul style="list-style-type: none"> <li>- History and philosophy of GNU / Linux. Text console. File system navigation. (pwd, ls, cd, less, cat, man, w, exit, ssh, mosh, ...)</li> <li>- Directories and files (mkdir, rmdir, rm, cp, mv, ...)</li> <li>- Users, groups, redirects and search. Regular expressions. (id, su, passwd, grep, ...)</li> <li>- File and directory attributes (chown, chgrp, chmod, ...)</li> <li>- Text editor vim</li> <li>- File content sorting and selection commands (sort, head, tail, nl, uniq, tac, shuf)</li> <li>- File system searching (find)</li> <li>- Processes (ps, top, kill)</li> <li>- sed - stream editor</li> <li>- Processing by awk</li> <li>- Basics of bash scripts</li> </ul>	

<b>Recommended literature:</b>					
<b>Languages necessary to complete the course:</b>					
<b>Notes:</b> The tasks are solved in a specialized software tool, which also enables effective distance synchronous education.					
<b>Past grade distribution</b> Total number of evaluated students: 1990					
A	B	C	D	E	FX
43,57	15,38	14,62	9,65	9,85	6,93
<b>Lecturers:</b> Mgr. Ivor Uhliarik, PhD.					
<b>Last change:</b> 20.06.2022					
<b>Approved by:</b> doc. RNDr. Damas Gruska, PhD.					

## COURSE DESCRIPTION

<b>Academic year:</b> 2025/2026	
<b>University:</b> Comenius University Bratislava	
<b>Faculty:</b> Faculty of Mathematics, Physics and Informatics	
<b>Course ID:</b> FMFI.KAI/1-AIN-412/22	<b>Course title:</b> Logic for Computer Science
<b>Educational activities:</b> <b>Type of activities:</b> course <b>Number of hours:</b> <b>per week: 6 per level/semester: 78</b> <b>Form of the course:</b> on-site learning	
<b>Number of credits:</b> 7	
<b>Recommended semester:</b> 4.	
<b>Educational level:</b> I.	
<b>Prerequisites:</b> FMFI.KAI/1-AIN-160/22 - Discrete Mathematics (2)	
<b>Course requirements:</b> Continuous assessment: Tests, assessed homework. Final exam admission condition: At least 60 % of the continuous assessment. Final exam: Written exam consisting of two parts (problem solving and theory). At least 60 % of each part. Continuous assessment / final exam proportion: 60/40 Scale: $A \geq 92\%$ , $B \geq 84\%$ , $C \geq 76\%$ , $D \geq 68\%$ , $E \geq 60\%$ . Scale of assessment (preliminary/final): 60/40	
<b>Learning outcomes:</b> The course introduces students to mathematical and computational logic. In particular, they learn to model and solve problems using the methods of logic, construct formal proofs and understand their relationship to informal ones. Students also acquire the fundamentals of theoretical concepts (model, semantics, soundness, completeness), enabling them to study more advanced logical methods with applications in computer science.	
<b>Class syllabus:</b> <ul style="list-style-type: none"> <li>- Propositional logic</li> <li>- First-order logic with equality</li> <li>- Formalization and modeling in logic</li> <li>- Tarski's semantics and an introduction to classical model theory</li> <li>- Introduction to proof theory, logical calculus (e.g., tableaux), soundness and completeness</li> <li>- Inference problems and their algorithmization</li> <li>- Overview of logic and inference applications, e.g., in databases, knowledge representations, artificial intelligence</li> </ul>	
<b>Recommended literature:</b> First-Order Logic / Raymond M. Smullyan. Springer, 1968. Logika: Neúplnost, složitost a nutnost / Vítězslav Švejdar. Praha : Academia, 2002. Language, Proof and Logic. / Dave Barker-Plummer, Jon Barwise and John Etchemendy. Stanford, CA : CSLI Publications, 2011.	

<b>Languages necessary to complete the course:</b> Slovak, English					
<b>Notes:</b>					
<b>Past grade distribution</b> Total number of evaluated students: 641					
A	B	C	D	E	FX
13,42	10,76	18,72	21,22	11,86	24,02
<b>Lecturers:</b> Mgr. Ján Kľuka, PhD., doc. RNDr. Ján Mazák, PhD., doc. RNDr. Martin Homola, PhD., Mgr. Júlia Pukancová, PhD., RNDr. Jozef Šiška, PhD., Mgr. Iveta Bečková, PhD.					
<b>Last change:</b> 07.05.2025					
<b>Approved by:</b> doc. RNDr. Damas Gruska, PhD.					

## COURSE DESCRIPTION

<b>Academic year:</b> 2025/2026	
<b>University:</b> Comenius University Bratislava	
<b>Faculty:</b> Faculty of Mathematics, Physics and Informatics	
<b>Course ID:</b> FMFI.KAI/1-AIN-306/22	<b>Course title:</b> Machine practicum _ learning and artificial intelligence on the visual data
<b>Educational activities:</b> <b>Type of activities:</b> course <b>Number of hours:</b> <b>per week:</b> 4 <b>per level/semester:</b> 52 <b>Form of the course:</b> on-site learning	
<b>Number of credits:</b> 5	
<b>Recommended semester:</b> 5.	
<b>Educational level:</b> I.	
<b>Prerequisites:</b>	
<b>Recommended prerequisites:</b> programming language Python	
<b>Course requirements:</b> Preliminary assessment: homeworks, Final assessment: exam (written test at computer) The indicative evaluation scale : A 90%, B 80%, C 70%, D 60%, E 50% Scale of assessment (preliminary/final): The scale of assessment (preliminary/final): 50/50	
<b>Learning outcomes:</b> After completing the course, students will acquire basic skills in working with basic libraries for 2D and 3D data processing (images, scans): OpenCV and PCL. They will be able to use it in various programming projects using artificial intelligence methods, especially machine learning results.	
<b>Class syllabus:</b> <ol style="list-style-type: none"> <li>1. Image representation and its processing, color models, conversions between them</li> <li>2. Morphological operations with image and contour detector and structural analysis</li> <li>3. Filters and kernels. Edge operators.</li> <li>4. Blending, apparent cloning, morphing, inpainting</li> <li>5. Image segmentation. MeanShift filter. GrabCut. Intrinsic image.</li> <li>6. Image alignment and registration. Phase correlation. ECC. Image features: SIFT, SURF, BRIEF, ORB.</li> <li>7. Camera and video. Optical flow. Stereovision. Camera calibration</li> <li>8. Machine learning: PCA, eigen images, SVM, cascade regressor</li> <li>9. Object detectors. Hough's transformation. Haarov detector. HOG detector. LBPH</li> <li>10. Tracking the movement of objects. Kalman filter. CamShift. MIL tracker. Motion detector.</li> <li>11. Use of deep learning models: Colorization, YOLO detectors, vectorization and recognition, EAST text detector, Tesseract OCR, GOTURN</li> <li>12. Usage of deep learning models: background removal, 3D reconstruction from 2D, 2D pose estimation, semantic segmentation.</li> </ol>	

13. Representation of 3D data and method of their acquisition. Reconstruction of 3D models, 6 DoF position estimation for gripping parts 14. Virtual reality, augmented reality 15. Applications: tracking the movement of cars from traffic cameras, tracking eye movement, processing 3D scans of characters					
<b>Recommended literature:</b> Learning OpenCV 3, Computer Vision in C++ with the OpenCV Library By Gary Bradski, Adrian Kaehler, O'Reilly Media, 2016 learnopencv.com pointclouds.org					
<b>Languages necessary to complete the course:</b> slovak, english					
<b>Notes:</b>					
<b>Past grade distribution</b> Total number of evaluated students: 43					
A	B	C	D	E	FX
20,93	25,58	37,21	13,95	2,33	0,0
<b>Lecturers:</b> doc. RNDr. Martin Madaras, PhD., RNDr. Zuzana Berger Haladová, PhD.					
<b>Last change:</b> 23.06.2022					
<b>Approved by:</b> doc. RNDr. Damas Gruska, PhD.					

## COURSE DESCRIPTION

<b>Academic year:</b> 2025/2026	
<b>University:</b> Comenius University Bratislava	
<b>Faculty:</b> Faculty of Mathematics, Physics and Informatics	
<b>Course ID:</b> FMFI.KMANM/1- AIN-188/22	<b>Course title:</b> Mathematical Analysis
<b>Educational activities:</b> <b>Type of activities:</b> lecture / practicals <b>Number of hours:</b> <b>per week:</b> 2 / 3 <b>per level/semester:</b> 26 / 39 <b>Form of the course:</b> on-site learning	
<b>Number of credits:</b> 8	
<b>Recommended semester:</b> 2.	
<b>Educational level:</b> I.	
<b>Prerequisites:</b>	
<b>Course requirements:</b> For the semester, the student can get 30 points for exercises, 30 points for written exams, the final written exam has a weight of 30 points. The student must obtain at least 25 points per semester and at least 15 points from the final written exam. Grading: A (82-90 points), B (73-81 points), C (64-72 points), D (55-63 points), E (46-54 points), Fx (0-45 points). Weight of the ongoing / final assessment: ongoing assessment 67% (33% exercise + 33% written exams) / 33% final written exam. Scale of assessment (preliminary/final): 67/33	
<b>Learning outcomes:</b> After completing the course the student is able to use the terms limit, derivative and integral in describing the results of events described using the functions of one variable and will master the basic methods of calculations of limits, derivatives and integrals.	
<b>Class syllabus:</b> Real numbers. Elementar functions. basic properties of functions (monotonicity, local extrema). Continuity and limit. Derivation and its geometrical interpretation, derivation as a velocity of change. General rules for differentiation. Applications of the derivative. Antiderivatives and indefinite integrals, general rules for integration. The idea of Riemann integral, the fundamental theorem.	
<b>Recommended literature:</b> Matematická analýza 1 / Milan Gera, Vladimír Ďurikovič. Bratislava : Alfa, 1990 Matematika : diel 1 : pre štúdium technických vied / Igor Kluvánek, Ladislav Mišík, Marko Švec. Bratislava : Alfa, 1971 Matematická analýza 1 / Jiří Brabec, František Martan, Zdeněk Rozenský. Praha : Státní nakladatelství technické literatury, 1985	
<b>Languages necessary to complete the course:</b> Slovak, English	



<b>Notes:</b>					
<b>Past grade distribution</b> Total number of evaluated students: 603					
A	B	C	D	E	FX
8,79	13,27	18,57	25,21	19,4	14,76
<b>Lecturers:</b> doc. RNDr. Zbyněk Kubáček, CSc., Ing. Ján Komara, PhD., Mgr. Emília Mit'ková, PhD., Mgr. Jana Havlíčková, PhD., Mgr. Ľudovít Balko, PhD.					
<b>Last change:</b> 24.06.2022					
<b>Approved by:</b> doc. RNDr. Damas Gruska, PhD.					

## COURSE DESCRIPTION

<b>Academic year:</b> 2025/2026	
<b>University:</b> Comenius University Bratislava	
<b>Faculty:</b> Faculty of Mathematics, Physics and Informatics	
<b>Course ID:</b> FMFI.KAI/1-AIN-472/22	<b>Course title:</b> Mobile Application Development
<b>Educational activities:</b> <b>Type of activities:</b> lecture / practicals <b>Number of hours:</b> <b>per week:</b> 2 / 2 <b>per level/semester:</b> 26 / 26 <b>Form of the course:</b> on-site learning	
<b>Type, volume, methods and workload of the student - additional information</b> 2hrs. lessons, 2hrs. exercises, homeworks and exercises, no final exam	
<b>Number of credits:</b> 6	
<b>Recommended semester:</b> 5.	
<b>Educational level:</b> I.	
<b>Prerequisites:</b>	
<b>Recommended prerequisites:</b> no	
<b>Antirequisites:</b> FMFI.KAI/1-AIN-472/15	
<b>Course requirements:</b> Grades: A 90%, B 80%, C 70%, D 60%, E 50%. Scale of assessment (preliminary/final): 100% (30% exercises+ 70% homeworks) / 0% final exam	
<b>Learning outcomes:</b> Design of mobile applications using Kotlin language in Android Studio	
<b>Class syllabus:</b> <ul style="list-style-type: none"> <li>- MIT App Inventor</li> <li>- Activity, views, intents, fragments</li> <li>- MVVM design pattern and JetPack</li> <li>- Persistency</li> <li>- Maps and location, gsm, wifi, gps</li> <li>- Retrofit – REST Client</li> <li>- Room – sql client</li> <li>- Firebase</li> <li>- sensor and sensor data</li> </ul>	
<b>Recommended literature:</b> Neil Smyth: Android Studio 4.0 Development Essentials - Kotlin Edition, 2020 Bruce Eckel & Svetlana Isakova: Atomic Kotlin, 2021	
<b>Languages necessary to complete the course:</b> Slovak	
<b>Notes:</b>	

<b>Past grade distribution</b>					
Total number of evaluated students: 161					
A	B	C	D	E	FX
19,25	6,21	9,32	15,53	38,51	11,18
<b>Lecturers:</b> RNDr. Peter Borovanský, PhD.					
<b>Last change:</b> 27.06.2022					
<b>Approved by:</b> doc. RNDr. Damas Gruska, PhD.					

## COURSE DESCRIPTION

<b>Academic year:</b> 2025/2026	
<b>University:</b> Comenius University Bratislava	
<b>Faculty:</b> Faculty of Mathematics, Physics and Informatics	
<b>Course ID:</b> FMFI.KAI/1-MAT-570/15	<b>Course title:</b> Modelling and Rendering Techniques
<b>Educational activities:</b> <b>Type of activities:</b> lecture / practicals <b>Number of hours:</b> <b>per week:</b> 2 / 2 <b>per level/semester:</b> 26 / 26 <b>Form of the course:</b> on-site learning	
<b>Number of credits:</b> 6	
<b>Recommended semester:</b> 5.	
<b>Educational level:</b> I.	
<b>Prerequisites:</b>	
<b>Antirequisites:</b> FMFI.KAI/1-MAT-570/00	
<b>Course requirements:</b> Continuous assessment: homework, individual work Examination: written, oral Indicative assessment scale: A 92%, B 84%, C 76%, D 68%, E 60% For the semester, the student can get 50% for exercises, 30% for homework, the final written exam has a weight of 20% and the oral exam is voluntary for 20%. The student must solve at least 30% of each homework in order to pass the final written exam. Grading: 92-100 A, 84-91 B, 76-83 C, 68-75 D, 60-67 E. Details on the subject page. Scale of assessment (preliminary/final): 30/70	
<b>Learning outcomes:</b> It acquaints students with the basic principles of geometric modeling, especially modeling of rigid teties, with the possibilities of local modifications of bodies and global operations on bodies represented by common techniques. Students will deepen their knowledge of rendering techniques.	
<b>Class syllabus:</b> The concept of geometric, quantitative and organizational model. Hierarchy in geometric models. Tools for defining objects, modifying them and storing them. Primitive (basic) objects and their most well-known characteristics. Local modifications and global operations with solids. CSG representation of objects (standard CSG primitives, regularized Boolean operations, identity transformations). Algorithm for construction of CSG - objects. Boundary representations of bodies (B - rep). Euler - Poincare formula and its meaning. Platonic bodies. Euler's operators. Boolean operations at border representations. Wall, edge and top representations of polyhedrons with non-variety surface. Solid modeling with polygonal meshes. Body modeling by sweeping methodology (extruded solids). Rendering techniques for shaded and color images. Object description-based rendering using implicit functions and CSG description. Basic principles of voxel rendering, image - oriented rendering and photo - modeling. Rendering of polygonal meshes. Rendering based on object or image redistribution techniques.	
<b>Recommended literature:</b>	

<b>Languages necessary to complete the course:</b> Slovak, English					
<b>Notes:</b>					
<b>Past grade distribution</b> Total number of evaluated students: 56					
A	B	C	D	E	FX
23,21	39,29	8,93	10,71	8,93	8,93
<b>Lecturers:</b> prof. RNDr. Roman Ďurikovič, PhD.					
<b>Last change:</b> 20.06.2022					
<b>Approved by:</b> doc. RNDr. Damas Gruska, PhD.					

## COURSE DESCRIPTION

<b>Academic year:</b> 2025/2026	
<b>University:</b> Comenius University Bratislava	
<b>Faculty:</b> Faculty of Mathematics, Physics and Informatics	
<b>Course ID:</b> FMFI.KAI/1-AIN-530/22	<b>Course title:</b> Multimedia
<b>Educational activities:</b> <b>Type of activities:</b> lecture <b>Number of hours:</b> <b>per week: 2 per level/semester: 26</b> <b>Form of the course:</b> on-site learning	
<b>Number of credits:</b> 2	
<b>Recommended semester:</b> 5.	
<b>Educational level:</b> I.	
<b>Prerequisites:</b>	
<b>Recommended prerequisites:</b> none	
<b>Course requirements:</b> Continuing evaluation: homework assignments (40%)) Exam: written with oral consultation (33%) Project: (27%) To successfully complete the course, student has to obtain at least 75% of points on the homework assignment and to obtain at least 60% of points on the final exam. Final grade: A 90%, B 86%, C 80%, D 70%, E 60% Scale of assessment (preliminary/final): 40/60	
<b>Learning outcomes:</b>	
<b>Class syllabus:</b> Multimedia, basic terms, examples, multimedia production, computer graphics - basic terms, multimedia formats, software for image manipulation, animation - introduction, animation formats, software for animation production, audio - basic terms, audio formats, audio editing software, digital video - basic terms, DV formats, DV production software, authoring software.	
<b>Recommended literature:</b> Holsinger, E.: Jak pracují multimedia, Brno, UNIS 1995 Kireš, M., Šnajder, Ľ., Kalakay, R.: Multimédia pre učiteľa, Bratislava, ÚIPŠ 2002 Ružický, E.: Úvod do počítačovej grafiky, Bratislava, UK 1991 Salanci, Ľ.: Práca s grafikou. Bratislava, SPN 2000 <a href="http://www.w3schools.com/media">www.w3schools.com/media</a> <a href="http://www.scantips.com">www.scantips.com</a>	
<b>Languages necessary to complete the course:</b>	
<b>Notes:</b>	

<b>Past grade distribution</b>					
Total number of evaluated students: 918					
A	B	C	D	E	FX
62,09	27,56	7,3	0,54	0,11	2,4
<b>Lecturers:</b> Ľubomír Lúčan, CSc., doc. RNDr. Damas Gruska, PhD.					
<b>Last change:</b> 26.06.2022					
<b>Approved by:</b> doc. RNDr. Damas Gruska, PhD.					

## COURSE DESCRIPTION

<b>Academic year:</b> 2025/2026	
<b>University:</b> Comenius University Bratislava	
<b>Faculty:</b> Faculty of Mathematics, Physics and Informatics	
<b>Course ID:</b> FMFI.KAI/2-AIN-286/22	<b>Course title:</b> Ontologies and Knowledge Engineering
<b>Educational activities:</b> <b>Type of activities:</b> lecture / practicals <b>Number of hours:</b> <b>per week:</b> 2 / 2 <b>per level/semester:</b> 26 / 26 <b>Form of the course:</b> on-site learning	
<b>Number of credits:</b> 5	
<b>Recommended semester:</b> 5.	
<b>Educational level:</b> I., II.	
<b>Prerequisites:</b>	
<b>Antirequisites:</b> FMFI.KAI/2-AIN-286/15	
<b>Course requirements:</b> Semester: project (60pts), ongoing work assessment (20pts) Exam: written exam (20pts) Min. passing requirements: 50% from the semester and 50% from the exam Indicative assessment scale: A 90%, B 80%, C 70%, D 60%, E 50% Scale of assessment (preliminary/final): 80/20	
<b>Learning outcomes:</b> Students become acquainted with ontologies, with their role in data representation and sharing, with ontological representation and query languages, and with ontology engineering methodologies. They will also get acquainted with Semantic Web standards and with the principles and possibilities of publishing data in the Linked Open Data network, as well as the use of such data in knowledge-based applications.	
<b>Class syllabus:</b> <ul style="list-style-type: none"> <li>- Ontologies and their applications</li> <li>- Well-known ontologies</li> <li>- Ontological representation languages (RDF, RDF Schema, OWL)</li> <li>- Ontologies and databases</li> <li>- SPARQL query language</li> <li>- Linked Open Data network</li> <li>- Ontology engineering</li> <li>- Applications of ontologies in informatics</li> </ul>	
<b>Recommended literature:</b> Staab, S. and Studer, R. eds., 2010. Handbook on ontologies. Springer Science & Business Media. Allemang, D. and Hendler, J., 2011. Semantic web for the working ontologist: effective modeling in RDFS and OWL. Elsevier. Selected relevant recent scientific papers.	



<b>Languages necessary to complete the course:</b> Slovak, English					
<b>Notes:</b>					
<b>Past grade distribution</b> Total number of evaluated students: 14					
A	B	C	D	E	FX
64,29	28,57	7,14	0,0	0,0	0,0
<b>Lecturers:</b> doc. RNDr. Martin Homola, PhD.					
<b>Last change:</b> 30.06.2022					
<b>Approved by:</b> doc. RNDr. Damas Gruska, PhD.					

## COURSE DESCRIPTION

<b>Academic year:</b> 2025/2026					
<b>University:</b> Comenius University Bratislava					
<b>Faculty:</b> Faculty of Mathematics, Physics and Informatics					
<b>Course ID:</b> FMFI.KAI/2-MXX-132/23		<b>Course title:</b> Participation in Empirical Research			
<b>Educational activities:</b> <b>Type of activities:</b> course <b>Number of hours:</b> <b>per week:</b> 2 <b>per level/semester:</b> 26 <b>Form of the course:</b> on-site learning					
<b>Number of credits:</b> 2					
<b>Recommended semester:</b> 1., 3., 5.					
<b>Educational level:</b> I., I.II., II.					
<b>Prerequisites:</b>					
<b>Course requirements:</b>					
<b>Learning outcomes:</b>					
<b>Class syllabus:</b>					
<b>Recommended literature:</b>					
<b>Languages necessary to complete the course:</b>					
<b>Notes:</b>					
<b>Past grade distribution</b> Total number of evaluated students: 201					
A	B	C	D	E	FX
89,55	1,49	1,49	0,0	2,99	4,48
<b>Lecturers:</b> Mgr. Xenia Daniela Poslon, PhD.					
<b>Last change:</b> 06.09.2023					
<b>Approved by:</b> doc. RNDr. Damas Gruska, PhD.					

## COURSE DESCRIPTION

<b>Academic year:</b> 2025/2026					
<b>University:</b> Comenius University Bratislava					
<b>Faculty:</b> Faculty of Mathematics, Physics and Informatics					
<b>Course ID:</b> FMFI.KAI/2-MXX-132/23		<b>Course title:</b> Participation in Empirical Research			
<b>Educational activities:</b> <b>Type of activities:</b> course <b>Number of hours:</b> <b>per week:</b> 2 <b>per level/semester:</b> 26 <b>Form of the course:</b> on-site learning					
<b>Number of credits:</b> 2					
<b>Recommended semester:</b> 2., 4., 6.					
<b>Educational level:</b> I., I.II., II.					
<b>Prerequisites:</b>					
<b>Course requirements:</b>					
<b>Learning outcomes:</b>					
<b>Class syllabus:</b>					
<b>Recommended literature:</b>					
<b>Languages necessary to complete the course:</b>					
<b>Notes:</b>					
<b>Past grade distribution</b> Total number of evaluated students: 201					
A	B	C	D	E	FX
89,55	1,49	1,49	0,0	2,99	4,48
<b>Lecturers:</b> Mgr. Xenia Daniela Poslon, PhD.					
<b>Last change:</b> 06.09.2023					
<b>Approved by:</b> doc. RNDr. Damas Gruska, PhD.					

## COURSE DESCRIPTION

<b>Academic year:</b> 2025/2026	
<b>University:</b> Comenius University Bratislava	
<b>Faculty:</b> Faculty of Mathematics, Physics and Informatics	
<b>Course ID:</b> FMFI.KAI/1-AIN-675/22	<b>Course title:</b> Philophy of Internet
<b>Educational activities:</b> <b>Type of activities:</b> lecture <b>Number of hours:</b> <b>per week: 2 per level/semester: 26</b> <b>Form of the course:</b> on-site learning	
<b>Number of credits:</b> 3	
<b>Recommended semester:</b> 6.	
<b>Educational level:</b> I.	
<b>Prerequisites:</b>	
<b>Course requirements:</b> Continuing evaluation: homework assignments (40%) Final presentation: (35%), final essey (25%) To successfully complete the course, student has to obtain at least 80% of points on homeworks. Final grade: A 90%, B 80%, C 70%, D 60%, E 50%	
<b>Learning outcomes:</b>	
<b>Class syllabus:</b> Brief history of information Internet and physical space, virtualization Internet and authors Small worlds and internet Power of searching machines Wikinomics and Wisdom of Crowd Internet and social networks	
<b>Recommended literature:</b> 1. Stephens-Davidowitz, Seth, Everybody Lies: Big Data, New Data, and What the Internet Can Tell Us About Who We Really Are, Dey Street Books, 2017 2. Mayer-Schonberger, Viktor, Cukier, Kenneth, Big Data, A Revolution That Will Transform How We Live, Work and Think, John Murray (Publishers), London, 2013 3. O'Neil, Cathy, Weapons of math destruction: How big data increases inequality and threatens democracy, Crown Publishing Group, Penguin Random House, UK, 2016 4. Pariser, Eli, The Filter Bubble, What the Internet is Hiding from You, Viking, Penguin Books, London, 2011 5. Barabási, Albert-László, V pavučine síti, Paseka, Praha, 2005 6. Blackmoreová, Susan, Teorie memů, Kultura a její evoluce, Portál, Praha, 1999 7. Don Tapscott, Anthony D. Williams, WIKINOMICS, How Mass Collaboration Changed Everything, Portfolio, Penguin Books, New York, 2006	
<b>Languages necessary to complete the course:</b>	

<b>Notes:</b>					
<b>Past grade distribution</b> Total number of evaluated students: 628					
A	B	C	D	E	FX
68,95	12,9	8,76	3,34	0,8	5,25
<b>Lecturers:</b> Ing. František Gyarfaš, CSc.					
<b>Last change:</b> 24.06.2022					
<b>Approved by:</b> doc. RNDr. Damas Gruska, PhD.					

## COURSE DESCRIPTION

<b>Academic year:</b> 2025/2026					
<b>University:</b> Comenius University Bratislava					
<b>Faculty:</b> Faculty of Mathematics, Physics and Informatics					
<b>Course ID:</b> FMFL.KTV/1-MXX-110/00		<b>Course title:</b> Physical Education and Sport (1)			
<b>Educational activities:</b> <b>Type of activities:</b> practicals <b>Number of hours:</b> <b>per week: 2 per level/semester: 26</b> <b>Form of the course:</b> on-site learning					
<b>Number of credits:</b> 0					
<b>Recommended semester:</b> 1.					
<b>Educational level:</b> I., I.II.					
<b>Prerequisites:</b>					
<b>Course requirements:</b> Grades: A 90%, B 80%, C 70%, D 60%, E 50% Scale of assessment (preliminary/final): 100/0					
<b>Learning outcomes:</b> 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.					
<b>Class syllabus:</b> 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.					
<b>Recommended literature:</b>					
<b>Languages necessary to complete the course:</b> Slovak, English					
<b>Notes:</b>					
<b>Past grade distribution</b> Total number of evaluated students: 7053					
A	B	C	D	E	FX
93,31	1,6	0,21	0,0	0,07	4,81
<b>Lecturers:</b> 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					

<b>Last change:</b> 16.06.2022
<b>Approved by:</b> doc. RNDr. Damas Gruska, PhD.

## COURSE DESCRIPTION

<b>Academic year:</b> 2025/2026					
<b>University:</b> Comenius University Bratislava					
<b>Faculty:</b> Faculty of Mathematics, Physics and Informatics					
<b>Course ID:</b> FMFL.KTV/1-MXX-120/22		<b>Course title:</b> Physical Education and Sport (2)			
<b>Educational activities:</b> <b>Type of activities:</b> practicals <b>Number of hours:</b> <b>per week: 2 per level/semester: 26</b> <b>Form of the course:</b> on-site learning					
<b>Number of credits:</b> 1					
<b>Recommended semester:</b> 2.					
<b>Educational level:</b> I., I.II.					
<b>Prerequisites:</b>					
<b>Course requirements:</b> Grades: A 90%, B 80%, C 70%, D 60%, E 50% Scale of assessment (preliminary/final): 100/0					
<b>Learning outcomes:</b> 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.					
<b>Class syllabus:</b> 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.					
<b>Recommended literature:</b>					
<b>Languages necessary to complete the course:</b> Slovak, English					
<b>Notes:</b>					
<b>Past grade distribution</b> Total number of evaluated students: 5840					
A	B	C	D	E	FX
95,6	1,51	0,14	0,09	0,05	2,62



<b>Lecturers:</b> 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
---

<b>Last change:</b> 15.03.2022
--------------------------------

<b>Approved by:</b> doc. RNDr. Damas Gruska, PhD.
---

## COURSE DESCRIPTION

<b>Academic year:</b> 2025/2026					
<b>University:</b> Comenius University Bratislava					
<b>Faculty:</b> Faculty of Mathematics, Physics and Informatics					
<b>Course ID:</b> FMFL.KTV/1-MXX-210/00		<b>Course title:</b> Physical Education and Sport (3)			
<b>Educational activities:</b> <b>Type of activities:</b> practicals <b>Number of hours:</b> <b>per week:</b> 2 <b>per level/semester:</b> 26 <b>Form of the course:</b> on-site learning					
<b>Number of credits:</b> 2					
<b>Recommended semester:</b> 3.					
<b>Educational level:</b> I., I.II.					
<b>Prerequisites:</b>					
<b>Course requirements:</b> Scale of assessment (preliminary/final): 100/0					
<b>Learning outcomes:</b>					
<b>Class syllabus:</b> To practise game combinations, tactical - mechanical elements in basketball, volleyball, soccer, floorball, ice hockey, badminton, competition rules in the sports specialization.					
<b>Recommended literature:</b>					
<b>Languages necessary to complete the course:</b> Slovak, English					
<b>Notes:</b>					
<b>Past grade distribution</b> Total number of evaluated students: 3268					
A	B	C	D	E	FX
98,29	0,46	0,09	0,03	0,0	1,13
<b>Lecturers:</b> 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					
<b>Last change:</b> 16.06.2022					
<b>Approved by:</b> doc. RNDr. Damas Gruska, PhD.					

## COURSE DESCRIPTION

<b>Academic year:</b> 2025/2026					
<b>University:</b> Comenius University Bratislava					
<b>Faculty:</b> Faculty of Mathematics, Physics and Informatics					
<b>Course ID:</b> FMFI.KTV/1-MXX-220/00		<b>Course title:</b> Physical Education and Sport (4)			
<b>Educational activities:</b> <b>Type of activities:</b> practicals <b>Number of hours:</b> <b>per week: 2 per level/semester: 26</b> <b>Form of the course:</b> on-site learning					
<b>Number of credits:</b> 2					
<b>Recommended semester:</b> 4.					
<b>Educational level:</b> I., I.II.					
<b>Prerequisites:</b>					
<b>Course requirements:</b> Scale of assessment (preliminary/final): 100/0					
<b>Learning outcomes:</b>					
<b>Class syllabus:</b> 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.					
<b>Recommended literature:</b>					
<b>Languages necessary to complete the course:</b> Slovak, English					
<b>Notes:</b>					
<b>Past grade distribution</b> Total number of evaluated students: 2956					
A	B	C	D	E	FX
97,94	0,17	0,1	0,03	0,0	1,76
<b>Lecturers:</b> 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					
<b>Last change:</b> 15.03.2022					
<b>Approved by:</b> doc. RNDr. Damas Gruska, PhD.					

## COURSE DESCRIPTION

<b>Academic year:</b> 2025/2026					
<b>University:</b> Comenius University Bratislava					
<b>Faculty:</b> Faculty of Mathematics, Physics and Informatics					
<b>Course ID:</b> FMFL.KTV/1-MXX-310/00		<b>Course title:</b> Physical Education and Sport (5)			
<b>Educational activities:</b> <b>Type of activities:</b> practicals <b>Number of hours:</b> <b>per week: 2 per level/semester: 26</b> <b>Form of the course:</b> on-site learning					
<b>Number of credits:</b> 2					
<b>Recommended semester:</b> 5.					
<b>Educational level:</b> I., I.II.					
<b>Prerequisites:</b>					
<b>Course requirements:</b> Scale of assessment (preliminary/final): 100/0					
<b>Learning outcomes:</b>					
<b>Class syllabus:</b> Preparation and participation of individuals and teams in the system of university sport competitions and sport events.					
<b>Recommended literature:</b>					
<b>Languages necessary to complete the course:</b> Slovak, English					
<b>Notes:</b>					
<b>Past grade distribution</b> Total number of evaluated students: 2172					
A	B	C	D	E	FX
98,66	0,37	0,09	0,0	0,0	0,87
<b>Lecturers:</b> 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					
<b>Last change:</b> 15.03.2022					
<b>Approved by:</b> doc. RNDr. Damas Gruska, PhD.					

## COURSE DESCRIPTION

<b>Academic year:</b> 2025/2026					
<b>University:</b> Comenius University Bratislava					
<b>Faculty:</b> Faculty of Mathematics, Physics and Informatics					
<b>Course ID:</b> FMFI.KTV/1-MXX-320/22		<b>Course title:</b> Physical Education and Sport (6)			
<b>Educational activities:</b> <b>Type of activities:</b> practicals <b>Number of hours:</b> <b>per week: 2 per level/semester: 26</b> <b>Form of the course:</b> on-site learning					
<b>Number of credits:</b> 1					
<b>Recommended semester:</b> 6.					
<b>Educational level:</b> I., I.II.					
<b>Prerequisites:</b>					
<b>Antirequisites:</b> FMFI.KTV/1-MXX-320/00					
<b>Course requirements:</b> Scale of assessment (preliminary/final): 100/0					
<b>Learning outcomes:</b>					
<b>Class syllabus:</b> 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.					
<b>Recommended literature:</b>					
<b>Languages necessary to complete the course:</b> Slovak, English					
<b>Notes:</b>					
<b>Past grade distribution</b> Total number of evaluated students: 204					
A	B	C	D	E	FX
94,61	0,49	0,49	0,0	0,0	4,41
<b>Lecturers:</b> 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					
<b>Last change:</b> 15.03.2022					
<b>Approved by:</b> doc. RNDr. Damas Gruska, PhD.					

## COURSE DESCRIPTION

<b>Academic year:</b> 2025/2026					
<b>University:</b> Comenius University Bratislava					
<b>Faculty:</b> Faculty of Mathematics, Physics and Informatics					
<b>Course ID:</b> FMFI.KAI/1-AIN-167/22		<b>Course title:</b> Practical Classes in Robotics			
<b>Educational activities:</b> <b>Type of activities:</b> seminar <b>Number of hours:</b> <b>per week:</b> 2 <b>per level/semester:</b> 26 <b>Form of the course:</b> on-site learning					
<b>Number of credits:</b> 3					
<b>Recommended semester:</b> 3.					
<b>Educational level:</b> I.					
<b>Prerequisites:</b>					
<b>Course requirements:</b> Evaluation during semester: reports, projects Approximate evaluation scale: A 90%, B 80%, C 70%, D 60%, E 50% Scale of assessment (preliminary/final): 100/0					
<b>Learning outcomes:</b> A student will understand control and programming of robots, processing signals from sensors, he or she will experience preparation and realisation of a individual or group project with robotic technologies in a lab with the support of the teacher.					
<b>Class syllabus:</b> The topics of the seminar include also: robotic control architectures, probabilistic robotics, multi-robot systems, evolutionary robotics, sensor systems and actuators, educational robotics, robotic contests, entertainment robotics, service robotics, embedded systems.					
<b>Recommended literature:</b> Robin R. Murphy: Introduction to AI Robotics, Second Edition MIT Press, 2019. From Animals to Animats, Proceedings to conferences 1-16, 1991-2021.					
<b>Languages necessary to complete the course:</b> Slovak or English					
<b>Notes:</b>					
<b>Past grade distribution</b> Total number of evaluated students: 68					
A	B	C	D	E	FX
72,06	11,76	2,94	0,0	0,0	13,24
<b>Lecturers:</b> Mgr. Pavel Petrovič, PhD.					
<b>Last change:</b> 07.04.2022					

**Approved by:** doc. RNDr. Damas Gruska, PhD.

## COURSE DESCRIPTION

<b>Academic year:</b> 2025/2026	
<b>University:</b> Comenius University Bratislava	
<b>Faculty:</b> Faculty of Mathematics, Physics and Informatics	
<b>Course ID:</b> FMFI.KAI/1-AIN-319/24	<b>Course title:</b> Probability and Statistics for Informaticians
<b>Educational activities:</b> <b>Type of activities:</b> lecture / practicals <b>Number of hours:</b> <b>per week:</b> 3 / 2 <b>per level/semester:</b> 39 / 26 <b>Form of the course:</b> on-site learning	
<b>Number of credits:</b> 6	
<b>Recommended semester:</b> 3.	
<b>Educational level:</b> I.	
<b>Prerequisites:</b>	
<b>Course requirements:</b> Teaching period: written exam Examination period: written exam Evaluation (in %): A 90%, B 80%, C 70%, D 60%, E 50% Scale of assessment (preliminary/final): 30/70	
<b>Learning outcomes:</b> 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.	
<b>Class syllabus:</b> 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 the regression line, Outlier detection	
<b>Recommended literature:</b> Harman, R., Filová, L.: Základy pravdepodobnosti pre študentov informatiky a dátovej vedy, FMFI UK, 2022. Janková, K., Pázman, A.: Pravdepodobnosť a štatistika, UK Bratislava, 2011.	
<b>Languages necessary to complete the course:</b> Slovak, English	
<b>Notes:</b>	



<b>Past grade distribution</b>					
Total number of evaluated students: 482					
A	B	C	D	E	FX
12,24	11,62	14,11	24,07	25,93	12,03
<b>Lecturers:</b> Dr. rer. nat. Tatiana Kossacká, MSc.					
<b>Last change:</b> 06.09.2024					
<b>Approved by:</b> doc. RNDr. Damas Gruska, PhD.					

## COURSE DESCRIPTION

<b>Academic year:</b> 2025/2026	
<b>University:</b> Comenius University Bratislava	
<b>Faculty:</b> Faculty of Mathematics, Physics and Informatics	
<b>Course ID:</b> FMFI.KAI+KDMFI/1- AIN-130/22	<b>Course title:</b> Programming (1)
<b>Educational activities:</b> <b>Type of activities:</b> lecture / practicals <b>Number of hours:</b> <b>per week:</b> 4 / 4 <b>per level/semester:</b> 52 / 52 <b>Form of the course:</b> on-site learning	
<b>Number of credits:</b> 9	
<b>Recommended semester:</b> 1.	
<b>Educational level:</b> I., I.II.	
<b>Prerequisites:</b>	
<b>Antirequisites:</b> FMFI.KAI/1-AIN-130/13	
<b>Course requirements:</b> Continuing evaluation: homework assignments (30%) Exam: midterm (20%) , written exam (50%) To successfully complete the course, student has to obtain at least 50% of points Final grade: A 90%, B 80%, C 70%, D 60%, E 50% Scale of assessment (preliminary/final): 30/70	
<b>Learning outcomes:</b> Students will gain basic programming skills in the Python object-oriented programming language, become familiar with the basic data structures of the language, and gain their first skills with object-oriented programming.	
<b>Class syllabus:</b> Python programming language development environment; programs, functions, recursion, modules; data structures, lists, strings, files, dictionaries, sets; graphical applications, events; object-oriented programming, inheritance, polymorphism.	
<b>Recommended literature:</b> Summerfield: Programming in Python 3, Addison-Wesley Professional 2009 Miller: How to Think Like a Computer Scientist: Interactive Edition, web: <a href="http://interactivepython.org/runestone/static/thinkcspy/index.html">http://interactivepython.org/runestone/static/thinkcspy/index.html</a>	
<b>Languages necessary to complete the course:</b> slovak, english	
<b>Notes:</b>	

<b>Past grade distribution</b>					
Total number of evaluated students: 1186					
A	B	C	D	E	FX
29,26	11,47	10,46	7,42	12,06	29,34
<b>Lecturers:</b> RNDr. Andrej Blaho, PhD., PaedDr. Andrea Hrušecká, PhD., PaedDr. Daniela Bezáková, PhD.					
<b>Last change:</b> 26.06.2022					
<b>Approved by:</b> doc. RNDr. Damas Gruska, PhD.					

## COURSE DESCRIPTION

<b>Academic year:</b> 2025/2026					
<b>University:</b> Comenius University Bratislava					
<b>Faculty:</b> Faculty of Mathematics, Physics and Informatics					
<b>Course ID:</b> FMFI.KAI+KDMFI/1-AIN-170/22		<b>Course title:</b> Programming (2)			
<b>Educational activities:</b> <b>Type of activities:</b> lecture / practicals <b>Number of hours:</b> <b>per week:</b> 2 / 2 <b>per level/semester:</b> 26 / 26 <b>Form of the course:</b> on-site learning					
<b>Number of credits:</b> 7					
<b>Recommended semester:</b> 2.					
<b>Educational level:</b> I.					
<b>Prerequisites:</b> FMFI.KAI+KDMFI/1-AIN-130/22 - Programming (1) or FMFI.KAI/1-AIN-130/16 - Programming (1)					
<b>Course requirements:</b> Continuing evaluation: homework assignments (30%) Exam: midterm (20%) , written exam (50%) To successfully complete the course, student has to obtain at least 60% of points Final grade: A 88%, B 81%, C 74%, D 67%, E 60% Scale of assessment (preliminary/final): 30/70					
<b>Learning outcomes:</b> Students will be introduced to more advanced linked data structures and basic algorithms on these structures.					
<b>Class syllabus:</b> more advanced data structures: stacks, queues, linked lists, trees, graphs various applications and basic algorithms with linked data structures basic sorting, searching and generating algorithms					
<b>Recommended literature:</b> Miller, Ranum: Problem Solving with Algorithms and Data Structures using Python, Interactive Edition, web: <a href="http://interactivepython.org/runestone/static/pythonds/index.html">http://interactivepython.org/runestone/static/pythonds/index.html</a>					
<b>Languages necessary to complete the course:</b>					
<b>Notes:</b>					
<b>Past grade distribution</b> Total number of evaluated students: 1124					
A	B	C	D	E	FX
34,79	12,81	11,21	9,25	13,79	18,15
<b>Lecturers:</b> RNDr. Andrej Blaho, PhD.					

<b>Last change:</b> 26.06.2022
<b>Approved by:</b> doc. RNDr. Damas Gruska, PhD.

## COURSE DESCRIPTION

<b>Academic year:</b> 2025/2026	
<b>University:</b> Comenius University Bratislava	
<b>Faculty:</b> Faculty of Mathematics, Physics and Informatics	
<b>Course ID:</b> FMFI.KDMFI/1-AIN-171/22	<b>Course title:</b> Programming (3)
<b>Educational activities:</b> <b>Type of activities:</b> course <b>Number of hours:</b> <b>per week:</b> 4 <b>per level/semester:</b> 52 <b>Form of the course:</b> on-site learning	
<b>Type, volume, methods and workload of the student - additional information</b> Principles of Object Programming, Learning Programming Language C++, developing algorithmic skills, principles of agile programming , Training Test Driven Development Methodology, learning clean code programming and demonstrating errors we make.	
<b>Number of credits:</b> 5	
<b>Recommended semester:</b> 3.	
<b>Educational level:</b> I.	
<b>Prerequisites:</b>	
<b>Course requirements:</b> Continuing evaluation: homework assignments (40%)) Exam: written with oral consultation (33%) Project: (27%) To successfully complete the course, student has to obtain at least 75% of points on the homework assignement and to obtain at least 60% of points on the final exam. Final grade: A 90%, B 86%, C 80%, D 70%, E 60% Scale of assessment (preliminary/final): 40/60	
<b>Learning outcomes:</b> The students will be able to use learned algorithms to design object programs in C++ language, they will be able to solve practical assignments and independently propose and implement application in the language. They will be able to employ the methodology of test-driven programming.	
<b>Class syllabus:</b> Statements, variable types, arrays, multi-dimensional arrays Functions, operators and their overloading Pointers, arrays, pointers to pointers, pointers to functions Global, local, static variables, type definitions Structures, classes Class hierarchy, abstract classes, dynamic inheritance, multiple inheritance Class constructors and destructors Function and method arguments, return values Streams, work with files Templates, STL, intelligent pointers Exceptions	

Parallelism					
<b>Recommended literature:</b> 1. Virius, Miroslav, Jazyky C a C++, Grada, 2011 2. Virius, Miroslav, 1001 tipů a triků pro C++, Computer Press, a.s., Brno 2011 3. Sutter, Herb, Alexandrescu, Andrei, C++ - 101 programovacích technik, Addison-Wesley, Zoner Press, Brno, 2005 4. Eckel, Bruce, Myslíme v C++, Grada, 2000 5. Eckel, Bruce, Allison, Chuck, Myslíme v C++ (2. díl), Grada, 2006 6. Virius, Miroslav, Pasti a propasti jazyka C++, 2. aktualizované a rozšířené vydání, CP Books, Computer Press, Brno, 2005					
<b>Languages necessary to complete the course:</b> Slovak, English					
<b>Notes:</b>					
<b>Past grade distribution</b> Total number of evaluated students: 1352					
A	B	C	D	E	FX
39,79	13,68	9,99	9,54	10,87	16,12
<b>Lecturers:</b> Ing. František Gyarfaš, CSc., Mgr. Ivor Uhliarík, PhD.					
<b>Last change:</b> 24.06.2022					
<b>Approved by:</b> doc. RNDr. Damas Gruska, PhD.					

## COURSE DESCRIPTION

<b>Academic year:</b> 2025/2026	
<b>University:</b> Comenius University Bratislava	
<b>Faculty:</b> Faculty of Mathematics, Physics and Informatics	
<b>Course ID:</b> FMFI.KAI+KDMFI/1-AIN-172/22	<b>Course title:</b> Programming (4)
<b>Educational activities:</b> <b>Type of activities:</b> course <b>Number of hours:</b> <b>per week:</b> 4 <b>per level/semester:</b> 52 <b>Form of the course:</b> on-site learning	
<b>Type, volume, methods and workload of the student - additional information</b> 2 hrs. lessons, 2 hrs. excersise	
<b>Number of credits:</b> 6	
<b>Recommended semester:</b> 4.	
<b>Educational level:</b> I.	
<b>Prerequisites:</b>	
<b>Recommended prerequisites:</b> 1-AIN-172 Programovanie (4)	
<b>Course requirements:</b> A 90%, B 80%, C 70%, D 60%, E 50% Scale of assessment (preliminary/final): 70% (homeworks, excercises, projekt) 30% (exam)	
<b>Learning outcomes:</b> design of algorithms in object-oriented environment, programming in JAVA and design of applications with the user's interface with JavaFX library	
<b>Class syllabus:</b> basic programming constructs of the language, comparison with C++ - basic data types and language components - fundamental JAVA libraries - linear data structures - object-orient programming in JAVA, classes, inheritance, interfaces - Java Collections - Java I/O, serialization - data structures and algorithms - threads and concurrent programs - design of applications with user's interface – JavaFX - Java Reflection Model	
<b>Recommended literature:</b> Eckel,B.: Thinking in Java, Prentice Hall, 1997 Goodrich,M.T, Tamassia,R.: Data Structures and Algorithms in Java, 3rd Ed., John Wiley & Sons, 2004 Herout,P.: Učebnice jazyka Java, Kopp,2003, Weiss M.A.: Data Structures & Problem Solving Using Java, Addison Wesley, 1998.	



<b>Languages necessary to complete the course:</b> Slovak					
<b>Notes:</b>					
<b>Past grade distribution</b> Total number of evaluated students: 919					
A	B	C	D	E	FX
33,84	8,27	17,63	19,7	10,88	9,68
<b>Lecturers:</b> RNDr. Peter Borovanský, PhD.					
<b>Last change:</b> 24.06.2022					
<b>Approved by:</b> doc. RNDr. Damas Gruska, PhD.					

## COURSE DESCRIPTION

<b>Academic year:</b> 2025/2026	
<b>University:</b> Comenius University Bratislava	
<b>Faculty:</b> Faculty of Mathematics, Physics and Informatics	
<b>Course ID:</b> FMFI.KDMFI/1-AIN-302/22	<b>Course title:</b> Programming (5)
<b>Educational activities:</b> <b>Type of activities:</b> course <b>Number of hours:</b> <b>per week:</b> 4 <b>per level/semester:</b> 52 <b>Form of the course:</b> on-site learning	
<b>Number of credits:</b> 6	
<b>Recommended semester:</b> 5.	
<b>Educational level:</b> I.	
<b>Prerequisites:</b>	
<b>Recommended prerequisites:</b> 1-AIN-210 Algorithms and data structures	
<b>Course requirements:</b> Active work on practice lessons at which a student solve assigned tasks is required. At least 80% of completed practice lessons are need to be admitted to the final examination. During the final examination, the student solves a practical assignment on a computer and according to obtained score, he/she receives a grade: A (90%), B (80%), C (70%), D (60%), E (50%) or FX (less than 50%). Scale of assessment (preliminary/final): 0/100	
<b>Learning outcomes:</b> Students will be able to solve problems in the C# programming language that require the design and use of custom data structures, object-oriented programming, and event-driven programming. They can evaluate the pros and cons of the C# programming language and compare it with other programming languages.	
<b>Class syllabus:</b> Introduction to C# Basic data types and program constructs Properties and events, input and output Files, arrays, objects Dynamic data structures Graphics, multimedia Comparison of C# with other programming languages Comparison of C# algorithms and data structure implementations with other programming languages	
<b>Recommended literature:</b> Liberty, J., MacDonald, B.: Learning C# 3.0. ISBN: 970-0-596-52106-6 Albahari, J., Albahari, B.: C# 4.0 Pocket Reference. ISBN: 978-1-441-39401-1 <a href="http://www.edi.fmph.uniba.sk/~salanci/C/index.html">www.edi.fmph.uniba.sk/~salanci/C/index.html</a>	

Any available information about C# programming					
<b>Languages necessary to complete the course:</b> Slovak, English					
<b>Notes:</b>					
<b>Past grade distribution</b> Total number of evaluated students: 234					
A	B	C	D	E	FX
70,51	3,42	7,26	6,84	8,12	3,85
<b>Lecturers:</b> doc. RNDr. Ľubomír Salanci, PhD.					
<b>Last change:</b> 15.06.2022					
<b>Approved by:</b> doc. RNDr. Damas Gruska, PhD.					

## COURSE DESCRIPTION

<b>Academic year:</b> 2025/2026	
<b>University:</b> Comenius University Bratislava	
<b>Faculty:</b> Faculty of Mathematics, Physics and Informatics	
<b>Course ID:</b> FMFI.KAI/1-AIN-430/22	<b>Course title:</b> Programming Paradigms
<b>Educational activities:</b> <b>Type of activities:</b> lecture / practicals <b>Number of hours:</b> <b>per week:</b> 2 / 2 <b>per level/semester:</b> 26 / 26 <b>Form of the course:</b> on-site learning	
<b>Type, volume, methods and workload of the student - additional information</b> 2 hrs. lessons, 2 hrs. excerses	
<b>Number of credits:</b> 6	
<b>Recommended semester:</b> 5.	
<b>Educational level:</b> I.	
<b>Prerequisites:</b>	
<b>Antirequisites:</b> FMFI.KAI/1-AIN-430/00	
<b>Course requirements:</b> Grades: A 90%, B 80%, C 70%, D 60%, E 50%. Scale of assessment (preliminary/final): regular exercises, midterm 70/30 midterm, exam, homeworks (12x3), midterm (25), exam (30)	
<b>Learning outcomes:</b> Introduction to three programming paradigms: Concurrent programming, Functional Programming, Logic Programming	
<b>Class syllabus:</b> <ul style="list-style-type: none"> <li>- Brief history of programming languages</li> <li>- Introduction to programming paradigms</li> <li>- Concurrent programming in GO</li> <li>- Functional programming in Haskell</li> <li>- Logic programming in Prolog</li> <li>- Constraint logic programing CLP</li> </ul>	
<b>Recommended literature:</b> Programming language pragmatics / Michael L. Scott. Amsterdam ; Boston : Elsevier/Morgan Kaufmann Pub.,, 2009 Programming in Haskell / Graham Hutton. Cambridge : Cambridge University Press, 2008 Pearls of functional algorithm design / Richard Bird. Cambridge : Cambridge University Press, 2010 The art of Prolog : Advanced programming techniques / Leon Sterling, Ehud Shapiro ; with a foreword by David H. D. Warren. Cambridge, Mass. : MIT Press, 1994 Haskell the craft of functional programming / Simon Thompson. Harlow : Pearson, 1999	

Real world Haskell / Bryan O'Sullivan, John Goerzen, Don Stewart. Sebastopol : O'Reilly Media, Inc., 2009					
<b>Languages necessary to complete the course:</b> Slovak					
<b>Notes:</b>					
<b>Past grade distribution</b> Total number of evaluated students: 128					
A	B	C	D	E	FX
37,5	5,47	8,59	18,75	25,0	4,69
<b>Lecturers:</b> RNDr. Peter Borovanský, PhD.					
<b>Last change:</b> 27.06.2022					
<b>Approved by:</b> doc. RNDr. Damas Gruska, PhD.					

## COURSE DESCRIPTION

<b>Academic year:</b> 2025/2026					
<b>University:</b> Comenius University Bratislava					
<b>Faculty:</b> Faculty of Mathematics, Physics and Informatics					
<b>Course ID:</b> FMFI.KJP/1-MXX-161/00		<b>Course title:</b> Russian Language (1)			
<b>Educational activities:</b> <b>Type of activities:</b> practicals <b>Number of hours:</b> <b>per week:</b> 2 <b>per level/semester:</b> 26 <b>Form of the course:</b> on-site learning					
<b>Number of credits:</b> 2					
<b>Recommended semester:</b> 1.					
<b>Educational level:</b> I., I.II., II.					
<b>Prerequisites:</b>					
<b>Course requirements:</b> Scale of assessment (preliminary/final): 100/0					
<b>Learning outcomes:</b> Basic communication in Russian, developing other Russian language skills - listening comprehension, reading and writing.					
<b>Class syllabus:</b> 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.					
<b>Recommended literature:</b> The textbook: : Точка Ру А1 (Ольга Долматова, Екатерина Новачац), pracovné karty Падежи 1 (Л.С. Безкоровайная, В.Е. Штыленко).					
<b>Languages necessary to complete the course:</b>					
<b>Notes:</b>					
<b>Past grade distribution</b> Total number of evaluated students: 738					
A	B	C	D	E	FX
57,86	16,53	10,98	4,2	1,76	8,67
<b>Lecturers:</b> Viktoria Mirsalova					
<b>Last change:</b> 20.06.2022					
<b>Approved by:</b> doc. RNDr. Damas Gruska, PhD.					

## COURSE DESCRIPTION

<b>Academic year:</b> 2025/2026					
<b>University:</b> Comenius University Bratislava					
<b>Faculty:</b> Faculty of Mathematics, Physics and Informatics					
<b>Course ID:</b> FMFI.KJP/1-MXX-162/00		<b>Course title:</b> Russian Language (2)			
<b>Educational activities:</b> <b>Type of activities:</b> practicals <b>Number of hours:</b> <b>per week: 2 per level/semester: 26</b> <b>Form of the course:</b> on-site learning					
<b>Number of credits:</b> 2					
<b>Recommended semester:</b> 2.					
<b>Educational level:</b> I., I.II., II.					
<b>Prerequisites:</b>					
<b>Course requirements:</b> Scale of assessment (preliminary/final): 100/0					
<b>Learning outcomes:</b> Basic communication in Russian, developing other Russian language skills - listening comprehension, reading and writing.					
<b>Class syllabus:</b> 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.					
<b>Recommended literature:</b> Textbook: Точка Ру А1 (Ольга Долматова, Екатерина Новачац), pracovné karty Падежи 1 (Л.С. Безкорвайная, В.Е. Штыленко).					
<b>Languages necessary to complete the course:</b>					
<b>Notes:</b>					
<b>Past grade distribution</b> Total number of evaluated students: 435					
A	B	C	D	E	FX
63,91	16,09	8,97	3,91	0,92	6,21
<b>Lecturers:</b> Viktoria Mirsalova					
<b>Last change:</b> 20.06.2022					
<b>Approved by:</b> doc. RNDr. Damas Gruska, PhD.					

## COURSE DESCRIPTION

<b>Academic year:</b> 2025/2026					
<b>University:</b> Comenius University Bratislava					
<b>Faculty:</b> Faculty of Mathematics, Physics and Informatics					
<b>Course ID:</b> FMFI.KJP/1-MXX-261/00		<b>Course title:</b> Russian Language (3)			
<b>Educational activities:</b> <b>Type of activities:</b> practicals <b>Number of hours:</b> <b>per week:</b> 2 <b>per level/semester:</b> 26 <b>Form of the course:</b> on-site learning					
<b>Number of credits:</b> 2					
<b>Recommended semester:</b> 3.					
<b>Educational level:</b> I., I.II., II.					
<b>Prerequisites:</b>					
<b>Course requirements:</b> Scale of assessment (preliminary/final): 100/0					
<b>Learning outcomes:</b> Basic communication in Russian, developing other Russian language skills - listening comprehension, reading and writing.					
<b>Class syllabus:</b> 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.					
<b>Recommended literature:</b> Точка Ру А2 (Ольга Долматова, Екатерина Новачац) а Short Stories in Russian (Olly Richards, Alex Rowlings)					
<b>Languages necessary to complete the course:</b>					
<b>Notes:</b>					
<b>Past grade distribution</b> Total number of evaluated students: 212					
A	B	C	D	E	FX
69,34	17,92	8,96	2,36	0,0	1,42
<b>Lecturers:</b> Viktoria Mirsalova					
<b>Last change:</b> 20.06.2022					
<b>Approved by:</b> doc. RNDr. Damas Gruska, PhD.					



## COURSE DESCRIPTION

<b>Academic year:</b> 2025/2026					
<b>University:</b> Comenius University Bratislava					
<b>Faculty:</b> Faculty of Mathematics, Physics and Informatics					
<b>Course ID:</b> FMFI.KJP/1-MXX-262/00		<b>Course title:</b> Russian Language (4)			
<b>Educational activities:</b> <b>Type of activities:</b> practicals <b>Number of hours:</b> <b>per week: 2 per level/semester: 26</b> <b>Form of the course:</b> on-site learning					
<b>Number of credits:</b> 2					
<b>Recommended semester:</b> 4.					
<b>Educational level:</b> I., I.II., II.					
<b>Prerequisites:</b>					
<b>Course requirements:</b> Scale of assessment (preliminary/final): 100/0					
<b>Learning outcomes:</b> 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.					
<b>Class syllabus:</b> 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.					
<b>Recommended literature:</b> Точка Ру А2 (Ольга Долматова, Екатерина Новачац) a Short Stories in Russian (Olly Richards, Alex Rowlings)					
<b>Languages necessary to complete the course:</b>					
<b>Notes:</b>					
<b>Past grade distribution</b> Total number of evaluated students: 153					
A	B	C	D	E	FX
74,51	14,38	7,19	2,61	0,65	0,65
<b>Lecturers:</b> Viktoria Mirsalova					
<b>Last change:</b> 20.06.2022					
<b>Approved by:</b> doc. RNDr. Damas Gruska, PhD.					

## COURSE DESCRIPTION

<b>Academic year:</b> 2025/2026	
<b>University:</b> Comenius University Bratislava	
<b>Faculty:</b> Faculty of Mathematics, Physics and Informatics	
<b>Course ID:</b> FMFI.KAI/2-IKV a-192/19	<b>Course title:</b> Science, Technology and Humanity: Opportunities and Risks
<b>Educational activities:</b> <b>Type of activities:</b> seminar <b>Number of hours:</b> <b>per week: 3 per level/semester: 39</b> <b>Form of the course:</b> on-site learning	
<b>Number of credits:</b> 5	
<b>Recommended semester:</b> 2., 4., 6.	
<b>Educational level:</b> I., I.II., II.	
<b>Prerequisites:</b>	
<b>Course requirements:</b> 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.	
<b>Learning outcomes:</b> 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.	
<b>Class syllabus:</b> Big data: privacy, politics and power, Internet of things, its 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.	
<b>Recommended literature:</b> - 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. Damas Gruska, PhD.

## COURSE DESCRIPTION

<b>Academic year:</b> 2025/2026							
<b>University:</b> Comenius University Bratislava							
<b>Faculty:</b> Faculty of Mathematics, Physics and Informatics							
<b>Course ID:</b> FMFI.KJP/1-MXX-171/20			<b>Course title:</b> Slovak Language for Foreign Students (1)				
<b>Educational activities:</b> <b>Type of activities:</b> practicals <b>Number of hours:</b> <b>per week: 2 per level/semester: 26</b> <b>Form of the course:</b> on-site learning							
<b>Number of credits:</b> 2							
<b>Recommended semester:</b> 1.							
<b>Educational level:</b> I., I.II., II., III.							
<b>Prerequisites:</b>							
<b>Course requirements:</b> tests Course prerequisites: <a href="https://fmph.uniba.sk/microsites/kjp/katedra-jazykovej-pripravy/poziadavky-na-udelenie-priebežneho-hodnotenia-aj1aj2aj3-ostatne-kurzy/">https://fmph.uniba.sk/microsites/kjp/katedra-jazykovej-pripravy/poziadavky-na-udelenie-priebežneho-hodnotenia-aj1aj2aj3-ostatne-kurzy/</a> Scale of assessment (preliminary/final): 100/0							
<b>Learning outcomes:</b> 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.							
<b>Class syllabus:</b> The syllabus is targeted at the comprehension of the basics of the Slovak language for the absolute beginners (A1).							
<b>Recommended literature:</b> Križom- Krážom Slovenčina 1, additional material to further support the covered topics.							
<b>Languages necessary to complete the course:</b>							
<b>Notes:</b>							
<b>Past grade distribution</b> 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
<b>Lecturers:</b> Mgr. Aneta Barnes							
<b>Last change:</b> 21.06.2022							
<b>Approved by:</b> doc. RNDr. Damas Gruska, PhD.							

## COURSE DESCRIPTION

<b>Academic year:</b> 2025/2026							
<b>University:</b> Comenius University Bratislava							
<b>Faculty:</b> Faculty of Mathematics, Physics and Informatics							
<b>Course ID:</b> FMFI.KJP/1-MXX-172/20			<b>Course title:</b> Slovak Language for Foreign Students (2)				
<b>Educational activities:</b> <b>Type of activities:</b> practicals <b>Number of hours:</b> <b>per week: 2 per level/semester: 26</b> <b>Form of the course:</b> on-site learning							
<b>Number of credits:</b> 2							
<b>Recommended semester:</b> 2.							
<b>Educational level:</b> I., I.II., II., III.							
<b>Prerequisites:</b>							
<b>Course requirements:</b> tests Course prerequisites: <a href="https://fmph.uniba.sk/microsites/kjp/katedra-jazykovej-pripravy/poziadavky-na-udelenie-priebežneho-hodnotenia-aj1aj2aj3-ostatne-kurzy/">https://fmph.uniba.sk/microsites/kjp/katedra-jazykovej-pripravy/poziadavky-na-udelenie-priebežneho-hodnotenia-aj1aj2aj3-ostatne-kurzy/</a> Scale of assessment (preliminary/final): 100/0							
<b>Learning outcomes:</b> 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.							
<b>Class syllabus:</b> The syllabus 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.							
<b>Recommended literature:</b> Križom- Krážom Slovenčina 1, additional material to further support the covered topics							
<b>Languages necessary to complete the course:</b>							
<b>Notes:</b>							
<b>Past grade distribution</b> 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
<b>Lecturers:</b> Mgr. Aneta Barnes							
<b>Last change:</b> 21.06.2022							
<b>Approved by:</b> doc. RNDr. Damas Gruska, PhD.							

## COURSE DESCRIPTION

<b>Academic year:</b> 2025/2026							
<b>University:</b> Comenius University Bratislava							
<b>Faculty:</b> Faculty of Mathematics, Physics and Informatics							
<b>Course ID:</b> FMFI.KJP/1-MXX-271/20			<b>Course title:</b> Slovak Language for Foreign Students (3)				
<b>Educational activities:</b> <b>Type of activities:</b> practicals <b>Number of hours:</b> <b>per week: 2 per level/semester: 26</b> <b>Form of the course:</b> on-site learning							
<b>Number of credits:</b> 2							
<b>Recommended semester:</b> 3.							
<b>Educational level:</b> I., I.II., II., III.							
<b>Prerequisites:</b>							
<b>Course requirements:</b> tests Course prerequisites: <a href="https://fmph.uniba.sk/microsites/kjp/katedra-jazykovej-pripravy/poziadavky-na-udelenie-priebežneho-hodnotenia-aj1aj2aj3-ostatne-kurzy/">https://fmph.uniba.sk/microsites/kjp/katedra-jazykovej-pripravy/poziadavky-na-udelenie-priebežneho-hodnotenia-aj1aj2aj3-ostatne-kurzy/</a> Scale of assessment (preliminary/final): 100/0							
<b>Learning outcomes:</b> 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.							
<b>Class syllabus:</b> The syllabus 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.							
<b>Recommended literature:</b> Križom-Krážom Slovenčina 2, additional material to further support the covered topics.							
<b>Languages necessary to complete the course:</b>							
<b>Notes:</b>							
<b>Past grade distribution</b> 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
<b>Lecturers:</b> Mgr. Aneta Barnes							
<b>Last change:</b> 21.06.2022							
<b>Approved by:</b> doc. RNDr. Damas Gruska, PhD.							

## COURSE DESCRIPTION

<b>Academic year:</b> 2025/2026							
<b>University:</b> Comenius University Bratislava							
<b>Faculty:</b> Faculty of Mathematics, Physics and Informatics							
<b>Course ID:</b> FMFI.KJP/1-MXX-272/20			<b>Course title:</b> Slovak Language for Foreign Students (4)				
<b>Educational activities:</b> <b>Type of activities:</b> practicals <b>Number of hours:</b> <b>per week: 2 per level/semester: 26</b> <b>Form of the course:</b> on-site learning							
<b>Number of credits:</b> 2							
<b>Recommended semester:</b> 4.							
<b>Educational level:</b> I., I.II., II., III.							
<b>Prerequisites:</b>							
<b>Course requirements:</b> tests Course prerequisites: <a href="https://fmph.uniba.sk/microsites/kjp/katedra-jazykovej-pripravy/poziadavky-na-udelenie-priebežneho-hodnotenia-aj1aj2aj3-ostatne-kurzy/">https://fmph.uniba.sk/microsites/kjp/katedra-jazykovej-pripravy/poziadavky-na-udelenie-priebežneho-hodnotenia-aj1aj2aj3-ostatne-kurzy/</a> Scale of assessment (preliminary/final): 100/0							
<b>Learning outcomes:</b> 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.							
<b>Class syllabus:</b> The syllabus 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.							
<b>Recommended literature:</b> Križom-Krážom Slovenčina 2, additional material to further support the covered topics.							
<b>Languages necessary to complete the course:</b>							
<b>Notes:</b>							
<b>Past grade distribution</b> 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
<b>Lecturers:</b> Mgr. Aneta Barnes							
<b>Last change:</b> 21.06.2022							
<b>Approved by:</b> doc. RNDr. Damas Gruska, PhD.							

## COURSE DESCRIPTION

<b>Academic year:</b> 2025/2026	
<b>University:</b> Comenius University Bratislava	
<b>Faculty:</b> Faculty of Mathematics, Physics and Informatics	
<b>Course ID:</b> FMFI.KAI/1-AIN-470/22	<b>Course title:</b> Specification and Verification of Programs
<b>Educational activities:</b> <b>Type of activities:</b> lecture / practicals <b>Number of hours:</b> <b>per week:</b> 2 / 2 <b>per level/semester:</b> 26 / 26 <b>Form of the course:</b> on-site learning	
<b>Number of credits:</b> 6	
<b>Recommended semester:</b> 6.	
<b>Educational level:</b> I., II.	
<b>Prerequisites:</b>	
<b>Antirequisites:</b> FMFI.KAI/1-AIN-470/00	
<b>Course requirements:</b> Preliminary assessment: two tests 60%. Final exam: test 40%. Scale: A 90%, B 80%, C 70%, D 60%, E 50%. Scale of assessment (preliminary/final): 60/40	
<b>Learning outcomes:</b> The course develops students' ability to demonstrate the correctness of programs, formally specify the required properties and proving them using various methods, particularly structural induction. Graduates gain knowledge of a particular formalization of recursive programs, proving their properties within a single logical theory Peano arithmetic. They also get hands-on experience with the specification and verification of a large number of programs.	
<b>Class syllabus:</b> 1. Declarative Programming. Primitive recursion. Recursion with measure. Iterative recursion. Recursion on notation. Pairing function and arithmetization. Structural recursion. 2. Specification-verification System. Peano Arithmetic. Mathematical induction. Extensions of arithmetic. Derived induction principles: complete induction, measure induction, structural induction. 3. Data Structures. Strings. Lists. Basic operations over lists. Sorting of lists. Applications of lists. Binary trees. Basic operations over binary trees. Binary search trees. Applications of trees. Symbolic expressions. Interpreter of programming language. Universal function.	
<b>Recommended literature:</b> [1] Specification and Verification of Programs / Ján Komara. Online. [2] Recursive Functions / Ján Komara. Online. [3] Úvod do deklaratívneho programovania / Ján Kľuka. Online.	
<b>Languages necessary to complete the course:</b> slovak, english	



<b>Notes:</b>					
<b>Past grade distribution</b>					
Total number of evaluated students: 13					
A	B	C	D	E	FX
53,85	0,0	0,0	7,69	30,77	7,69
<b>Lecturers:</b> doc. RNDr. Damas Gruska, PhD., Ing. Ján Komara, PhD., Mgr. Ján Klůka, PhD.					
<b>Last change:</b> 11.03.2022					
<b>Approved by:</b> doc. RNDr. Damas Gruska, PhD.					

## COURSE DESCRIPTION

<b>Academic year:</b> 2025/2026					
<b>University:</b> Comenius University Bratislava					
<b>Faculty:</b> Faculty of Mathematics, Physics and Informatics					
<b>Course ID:</b> FMFL.KTV/1-MXX-115/15		<b>Course title:</b> Sports in Nature (1)			
<b>Educational activities:</b> <b>Type of activities:</b> <b>Number of hours:</b> <b>per week:</b> <b>per level/semester:</b> <b>Form of the course:</b> on-site learning					
<b>Number of credits:</b> 2					
<b>Recommended semester:</b> 1.					
<b>Educational level:</b> I., I.II.					
<b>Prerequisites:</b>					
<b>Course requirements:</b> 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.					
<b>Learning outcomes:</b> 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.					
<b>Class syllabus:</b> 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.					
<b>Recommended literature:</b>					
<b>Languages necessary to complete the course:</b> Slovak					
<b>Notes:</b> KTVŠ does not rent ski equipment.					
<b>Past grade distribution</b> Total number of evaluated students: 300					
A	B	C	D	E	FX
99,0	0,33	0,33	0,0	0,0	0,33
<b>Lecturers:</b> 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					

<b>Last change:</b> 16.06.2022
<b>Approved by:</b> doc. RNDr. Damas Gruska, PhD.

## COURSE DESCRIPTION

<b>Academic year:</b> 2025/2026					
<b>University:</b> Comenius University Bratislava					
<b>Faculty:</b> Faculty of Mathematics, Physics and Informatics					
<b>Course ID:</b> FMFL.KTV/1-MXX-215/15		<b>Course title:</b> Sports in Nature (2)			
<b>Educational activities:</b> <b>Type of activities:</b> <b>Number of hours:</b> <b>per week:</b> <b>per level/semester:</b> <b>Form of the course:</b> on-site learning					
<b>Number of credits:</b> 2					
<b>Recommended semester:</b> 2.					
<b>Educational level:</b> I., I.II.					
<b>Prerequisites:</b>					
<b>Course requirements:</b> 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.					
<b>Learning outcomes:</b> 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.					
<b>Class syllabus:</b> 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.					
<b>Recommended literature:</b>					
<b>Languages necessary to complete the course:</b> Slovak					
<b>Notes:</b> KTVŠ will provide sports equipment.					
<b>Past grade distribution</b> Total number of evaluated students: 297					
A	B	C	D	E	FX
92,59	0,0	0,0	0,0	0,34	7,07

<b>Lecturers:</b> 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
--

<b>Last change:</b> 16.06.2022
--------------------------------

<b>Approved by:</b> doc. RNDr. Damas Gruska, PhD.
---

## COURSE DESCRIPTION

<b>Academic year:</b> 2025/2026					
<b>University:</b> Comenius University Bratislava					
<b>Faculty:</b> Faculty of Mathematics, Physics and Informatics					
<b>Course ID:</b> FMFI.KTV/1-MXX-216/18		<b>Course title:</b> Sports in Nature (3)			
<b>Educational activities:</b> <b>Type of activities:</b> <b>Number of hours:</b> <b>per week: per level/semester:</b> <b>Form of the course:</b> on-site learning					
<b>Number of credits:</b> 1					
<b>Recommended semester:</b> 3.					
<b>Educational level:</b> I., I.II.					
<b>Prerequisites:</b>					
<b>Antirequisites:</b> FMFI.KTV/1-UXX-151/22					
<b>Course requirements:</b> 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.					
<b>Learning outcomes:</b> 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.					
<b>Class syllabus:</b> 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.					
<b>Recommended literature:</b>					
<b>Languages necessary to complete the course:</b> Slovak					
<b>Notes:</b> KTVŠ does not rent ski equipment.					
<b>Past grade distribution</b> Total number of evaluated students: 55					
A	B	C	D	E	FX
98,18	0,0	0,0	0,0	0,0	1,82

<b>Lecturers:</b> 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
<b>Last change:</b> 16.06.2022
<b>Approved by:</b> doc. RNDr. Damas Gruska, PhD.

## COURSE DESCRIPTION

<b>Academic year:</b> 2025/2026					
<b>University:</b> Comenius University Bratislava					
<b>Faculty:</b> Faculty of Mathematics, Physics and Informatics					
<b>Course ID:</b> FMFI.KTV/1-MXX-217/18		<b>Course title:</b> Sports in Nature (4)			
<b>Educational activities:</b> <b>Type of activities:</b> <b>Number of hours:</b> <b>per week:</b> <b>per level/semester:</b> <b>Form of the course:</b> on-site learning					
<b>Number of credits:</b> 1					
<b>Recommended semester:</b> 4.					
<b>Educational level:</b> I., I.II.					
<b>Prerequisites:</b>					
<b>Antirequisites:</b> FMFI.KTV/1-UXX-152/22					
<b>Course requirements:</b> 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.					
<b>Learning outcomes:</b> 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.					
<b>Class syllabus:</b> 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.					
<b>Recommended literature:</b>					
<b>Languages necessary to complete the course:</b> Slovak					
<b>Notes:</b> KTVŠ will provide material equipment.					
<b>Past grade distribution</b> Total number of evaluated students: 40					
A	B	C	D	E	FX
90,0	0,0	0,0	0,0	0,0	10,0



<b>Lecturers:</b> 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
<b>Last change:</b> 16.06.2022
<b>Approved by:</b> doc. RNDr. Damas Gruska, PhD.

## COURSE DESCRIPTION

<b>Academic year:</b> 2025/2026					
<b>University:</b> Comenius University Bratislava					
<b>Faculty:</b> Faculty of Mathematics, Physics and Informatics					
<b>Course ID:</b> FMFI.KJP/1-MXX-133/18		<b>Course title:</b> Supplementary English Course (1)			
<b>Educational activities:</b> <b>Type of activities:</b> practicals <b>Number of hours:</b> <b>per week:</b> 2 <b>per level/semester:</b> 26 <b>Form of the course:</b> on-site learning					
<b>Number of credits:</b> 2					
<b>Recommended semester:</b> 1.					
<b>Educational level:</b> I., I.II.					
<b>Prerequisites:</b>					
<b>Course requirements:</b> tests, homework Scale of assessment (preliminary/final): 100/0 credit - 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: <a href="https://fmph.uniba.sk/microsites/kjp/katedra-jazykovej-pripravy/poziadavky-na-udelenie-priebezhneho-hodnotenia-aj1aj2aj3-ostatne-kurzy/">https://fmph.uniba.sk/microsites/kjp/katedra-jazykovej-pripravy/poziadavky-na-udelenie-priebezhneho-hodnotenia-aj1aj2aj3-ostatne-kurzy/</a>					
<b>Learning outcomes:</b>					
<b>Class syllabus:</b> Texts dealing with the most important topics for FMPI majors combining grammar revision with vocabulary needed to pass the A4 English exam.					
<b>Recommended literature:</b> 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					
<b>Languages necessary to complete the course:</b> English					
<b>Notes:</b>					
<b>Past grade distribution</b> Total number of evaluated students: 68					
A	B	C	D	E	FX
51,47	20,59	7,35	4,41	4,41	11,76
<b>Lecturers:</b> Mgr. Ing. Jana Kočvarová					

<b>Last change:</b> 11.04.2024
<b>Approved by:</b> doc. RNDr. Damas Gruska, PhD.

## COURSE DESCRIPTION

<b>Academic year:</b> 2025/2026					
<b>University:</b> Comenius University Bratislava					
<b>Faculty:</b> Faculty of Mathematics, Physics and Informatics					
<b>Course ID:</b> FMFI.KJP/1-MXX-134/18		<b>Course title:</b> Supplementary English Course (2)			
<b>Educational activities:</b> <b>Type of activities:</b> practicals <b>Number of hours:</b> <b>per week: 2 per level/semester: 26</b> <b>Form of the course:</b> on-site learning					
<b>Number of credits:</b> 2					
<b>Recommended semester:</b> 2.					
<b>Educational level:</b> I., I.II.					
<b>Prerequisites:</b>					
<b>Course requirements:</b> 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: <a href="https://fmph.uniba.sk/microsites/kjp/katedra-jazykovej-pripravy/poziadavky-na-udelenie-priebezhneho-hodnotenia-aj1aj2aj3-ostatne-kurzy/">https://fmph.uniba.sk/microsites/kjp/katedra-jazykovej-pripravy/poziadavky-na-udelenie-priebezhneho-hodnotenia-aj1aj2aj3-ostatne-kurzy/</a>					
<b>Learning outcomes:</b>					
<b>Class syllabus:</b> Texts dealing with the most important topics for FMPI majors combining grammar revision with vocabulary needed to pass the A4 English exam.					
<b>Recommended literature:</b> 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					
<b>Languages necessary to complete the course:</b> English					
<b>Notes:</b>					
<b>Past grade distribution</b> Total number of evaluated students: 72					
A	B	C	D	E	FX
54,17	13,89	4,17	8,33	5,56	13,89
<b>Lecturers:</b> Mgr. Ing. Jana Kočvarová					
<b>Last change:</b> 11.04.2024					

**Approved by:** doc. RNDr. Damas Gruska, PhD.

## COURSE DESCRIPTION

<b>Academic year:</b> 2025/2026	
<b>University:</b> Comenius University Bratislava	
<b>Faculty:</b> Faculty of Mathematics, Physics and Informatics	
<b>Course ID:</b> FMFI.KAI/1-AIN-316/22	<b>Course title:</b> Technologies of Digital Fabrication
<b>Educational activities:</b> <b>Type of activities:</b> course <b>Number of hours:</b> <b>per week: 3 per level/semester: 39</b> <b>Form of the course:</b> on-site learning	
<b>Number of credits:</b> 3	
<b>Recommended semester:</b> 4., 6.	
<b>Educational level:</b> I.	
<b>Prerequisites:</b>	
<b>Course requirements:</b> Student will be able to use the digital technologies in the subject of study, he or she will document it by realizing a small project. Student must present his or her project that was implemented with the use of digital technologies. During the semester, student can get points for solving tasks. Approximate evaluation scale: A 90%, B 80%, C 70%, D 60%, E 50% Scale of assessment (preliminary/final): 100/0	
<b>Learning outcomes:</b> Student will acquire basic information and knowledge about digital technologies of production, how to prepare a computer code and transform it into real objects. Students will be able to transform their ideas to a prototype and document their ideas with practical experience with production tools. They will know about various formats of codes, and the process of their transformation to physical objects. Students will learn how to use the tools of digital production Fab Lab for rapid prototyping, how to use CAD software modelling, vinyl cutter, laser cutter, 3D printer, 3D scanner, CNC machine, electronic construction of circuit boards.	
<b>Class syllabus:</b> 1. Elementary tools and safety in Fablab. 2. CAD 2D, 2.5D, 3D. 3. Computer controlled cutting. 4. Electronic construction. 5. 3D scanning and printing. 6. Computer aided manufacturing (CNC).	
<b>Recommended literature:</b> Neil Gershenfeld, Fab: The Coming Revolution on Your Desktop-From Personal Computers to Personal Fabrication. ReadHowYouWant.com. 2011. 381 s. ISBN 978-1- 4596-1057- 6.	
<b>Languages necessary to complete the course:</b> Slovak, English	
<b>Notes:</b>	

the meetings take place in Fablab (5 min. walk from faculty building)					
<b>Past grade distribution</b>					
Total number of evaluated students: 113					
A	B	C	D	E	FX
67,26	17,7	5,31	4,42	3,54	1,77
<b>Lecturers:</b> Mgr. Pavel Petrovič, PhD., Ing. Jozef Vaško					
<b>Last change:</b> 24.06.2022					
<b>Approved by:</b> doc. RNDr. Damas Gruska, PhD.					

## COURSE DESCRIPTION

<b>Academic year:</b> 2025/2026	
<b>University:</b> Comenius University Bratislava	
<b>Faculty:</b> Faculty of Mathematics, Physics and Informatics	
<b>Course ID:</b> FMFI.KI/2-INF-176/15	<b>Course title:</b> Unix for System Administrators
<b>Educational activities:</b> <b>Type of activities:</b> lecture / practicals <b>Number of hours:</b> <b>per week:</b> 2 / 2 <b>per level/semester:</b> 26 / 26 <b>Form of the course:</b> on-site learning	
<b>Number of credits:</b> 6	
<b>Recommended semester:</b> 5.	
<b>Educational level:</b> I., II.	
<b>Prerequisites:</b>	
<b>Course requirements:</b> Practical assignments (both during the semester and on final exam) Approximate grading scale: A 92%, B 84%, C 76%, D 68%, E 60% Scale of assessment (preliminary/final): 40/60	
<b>Learning outcomes:</b> After completing the course the students will know the principles of UNIX system administration and they will be able to practically carry out the basic duties of a system administrator.	
<b>Class syllabus:</b> users, groups, passwords access permissions for files and directories, ACL filesystem structure character and block devices special filesystem objects (symlink, pipe) mounting and unmounting of filesystems to the directory hierarchy (mount, umount, /etc/fstab) creating filesystems system startup and shutdown - /etc/inittab, runlevels job scheduling (cron, at, batch) TCP/IP configuration (ifconfig, route) network services (/etc/services, /etc/inetd.conf, /etc/protocols, /etc/hosts, ...) DNS – client (/etc/resolv.conf) DNS – server NFS Firewall SystemD Assumptions: good user-level knowledge of UNIX systems, directory hierarchy navigation, creating and editing files (vi, joe), shell programming (sh/bash), commands find, grep, cat, cut, ls, awk.	
<b>Recommended literature:</b>	



Course notes provided on the course website, freely available electronic materials					
<b>Languages necessary to complete the course:</b> Slovak, English					
<b>Notes:</b>					
<b>Past grade distribution</b> Total number of evaluated students: 273					
A	B	C	D	E	FX
15,38	28,94	26,74	14,65	9,52	4,76
<b>Lecturers:</b> RNDr. Jaroslav Janáček, PhD., Ing. Dušan Bernát, PhD., doc. Mgr. Tomáš Plachetka, Dr.					
<b>Last change:</b> 22.06.2022					
<b>Approved by:</b> doc. RNDr. Damas Gruska, PhD.					

## COURSE DESCRIPTION

<b>Academic year:</b> 2025/2026	
<b>University:</b> Comenius University Bratislava	
<b>Faculty:</b> Faculty of Mathematics, Physics and Informatics	
<b>Course ID:</b> FMFI.KAI/1-AIN-415/25	<b>Course title:</b> Values and Accountability in Computing and Artificial Intelligence
<b>Educational activities:</b> <b>Type of activities:</b> lecture / practicals <b>Number of hours:</b> <b>per week:</b> 2 / 2 <b>per level/semester:</b> 26 / 26 <b>Form of the course:</b> on-site learning	
<b>Number of credits:</b> 3	
<b>Recommended semester:</b> 4.	
<b>Educational level:</b> I.	
<b>Prerequisites:</b>	
<b>Recommended prerequisites:</b> none	
<b>Course requirements:</b> (50 %) active participation in seminars / (50 %) final presentation of the selected topic Scale of assessment (preliminary/final): 50/50	
<b>Learning outcomes:</b> After completing the course, students will be able to: <ul style="list-style-type: none"> <li>- Identify basic ethical issues related to the development and use of IT and AI technologies.</li> <li>- Apply ethical frameworks to analyze specific cases in computer science.</li> <li>- Understand the relationship between technology, values, and society.</li> <li>- Consider the impacts of IT and AI decisions on user privacy, responsibility for their data, and the transparency of the processes of those processing them.</li> <li>- Recognize dilemmas from the perspective of the different interests of different stakeholders.</li> <li>- Approach critically the design, use, and regulation of digital systems.</li> </ul>	
<b>Class syllabus:</b> <ol style="list-style-type: none"> <li>1. The role of ethics in IT and AI</li> <li>2. Values and technology</li> <li>3. Transparency and accountability of algorithms</li> <li>4. Bias and fairness in AI systems</li> <li>5. Privacy and digital identity</li> <li>6. Control, surveillance and autonomy</li> <li>7. Societal impacts of informatization and artificial intelligence</li> <li>8. Ethics of interaction: chatbots, assistants and social AI</li> <li>9. Sustainability of digital systems</li> <li>10. Interoperability, standards and digital inclusion</li> <li>11. Research ethics and academic integrity with a focus on the use of AI tools</li> <li>12. Democracy, power and regulation in the age of AI</li> </ol>	

<b>Recommended literature:</b> Shannon Vallor (2016): Technology and the Virtues. Batya Friedman, Peter H. Kahn Jr., Alan Borning (2006): Value Sensitive Design and Information Systems. Selbst et al. (2019): Fairness and Abstraction in Sociotechnical Systems. Binns, R. (2018): Fairness in Machine Learning: Lessons from Political Philosophy. Communications of the ACM.					
<b>Languages necessary to complete the course:</b> Slovak / English (recommended literature)					
<b>Notes:</b>					
<b>Past grade distribution</b> Total number of evaluated students: 0					
A	B	C	D	E	FX
0,0	0,0	0,0	0,0	0,0	0,0
<b>Lecturers:</b> PhDr. Ing. Tomáš Gál, PhD.					
<b>Last change:</b> 25.07.2025					
<b>Approved by:</b> doc. RNDr. Damas Gruska, PhD.					

## COURSE DESCRIPTION

<b>Academic year:</b> 2025/2026	
<b>University:</b> Comenius University Bratislava	
<b>Faculty:</b> Faculty of Mathematics, Physics and Informatics	
<b>Course ID:</b> FMFI.KDMFI/1-AIN-189/22	<b>Course title:</b> Web Applications (1)
<b>Educational activities:</b> <b>Type of activities:</b> lecture / practicals <b>Number of hours:</b> <b>per week:</b> 2 / 2 <b>per level/semester:</b> 26 / 26 <b>Form of the course:</b> on-site learning	
<b>Number of credits:</b> 6	
<b>Recommended semester:</b> 2.	
<b>Educational level:</b> I.	
<b>Prerequisites:</b>	
<b>Recommended prerequisites:</b> 1-AIN-112 Introduction to web technologies	
<b>Antirequisites:</b> FMFI.KZVI/1-AIN-615/00	
<b>Course requirements:</b> Intermediate assessment: practical assignments, project (max 20%) Exam: practical (at least 70% of the semester points are needed) Indicative evaluation scale: A 90%, B 80%, C 70%, D 60%, E 50% Scale of assessment (preliminary/final): 20/80	
<b>Learning outcomes:</b> After completing the course, students will be able to create a simple server-side web application with personalized access to individual parts of the application. The data will be stored in a database.	
<b>Class syllabus:</b> <ul style="list-style-type: none"> <li>- Server-side web applications</li> <li>- Introduction to PHP</li> <li>- Basic language structures (1)</li> <li>- Variables, constants, strings, operators, conditions, loops</li> <li>- Basic language structures (2)</li> <li>- working with date and time, arrays, functions to work with arrays and strings</li> <li>- Reusing code</li> <li>- Form processing, input processing and treatment</li> <li>- SESSION, COOKIES</li> <li>- Introduction to working with a database</li> <li>- Basic database queries</li> <li>- SELECT, INSERT, UPDATE, DELETE</li> <li>- Linking PHP to the database</li> <li>- Working with multiple tables at the same time</li> </ul>	

<b>Recommended literature:</b> actual documentation for each technology w3schools.com own electronic texts published on the website or in the Moodle environment					
<b>Languages necessary to complete the course:</b> Slovak, English					
<b>Notes:</b>					
<b>Past grade distribution</b> Total number of evaluated students: 1078					
A	B	C	D	E	FX
40,17	12,43	10,11	10,67	9,83	16,79
<b>Lecturers:</b> PaedDr. Roman Hrušecký, PhD., RNDr. Marek Nagy, PhD., doc. RNDr. Zuzana Kubincová, PhD.					
<b>Last change:</b> 21.06.2022					
<b>Approved by:</b> doc. RNDr. Damas Gruska, PhD.					

## COURSE DESCRIPTION

<b>Academic year:</b> 2025/2026	
<b>University:</b> Comenius University Bratislava	
<b>Faculty:</b> Faculty of Mathematics, Physics and Informatics	
<b>Course ID:</b> FMFI.KAI/1-AIN-244/22	<b>Course title:</b> Web Applications (2)
<b>Educational activities:</b> <b>Type of activities:</b> lecture / practicals <b>Number of hours:</b> <b>per week:</b> 2 / 2 <b>per level/semester:</b> 26 / 26 <b>Form of the course:</b> on-site learning	
<b>Type, volume, methods and workload of the student - additional information</b> talk, 2h/week, online synchronous training, 2h/week, online synchronous	
<b>Number of credits:</b> 4	
<b>Recommended semester:</b> 4.	
<b>Educational level:</b> I.	
<b>Prerequisites:</b>	
<b>Course requirements:</b> Priebežné hodnotenie: practical computer exercises Skúška: practical computer exam Orientačná stupnica hodnotenia: A 92%, B 84%, C 76%, D 68%, E 60%	
<b>Learning outcomes:</b> Graduate: - knows advanced JavaScript syntax, HTML DOM structure and its JavaScript API - creates JavaScript programs - recognizes and uses the Node.js application and its modules Express, Socket.IO and Mysql - understands distributed architecture, unidirectional and bidirectional communication between server and clients - creates an interactive real-time web application using bidirectional communication - creates graphic animations, sound effects, ... to increase the user-friendliness of the web application	
<b>Class syllabus:</b> - JavaScript basics - Objects and classes in JavaScript - Node.js - Window, BOM a DOM - Node.js: module Express - Node.js: module Socket.IO , Promise - Node.js: module mysql, Sessions - HTML canvas - Animations - Media processing - Drag&Drop and Web Worker	

- Web Audio API					
<b>Recommended literature:</b>					
<b>Languages necessary to complete the course:</b>					
<b>Notes:</b>					
<b>Past grade distribution</b>					
Total number of evaluated students: 270					
A	B	C	D	E	FX
48,89	8,89	11,11	7,41	11,11	12,59
<b>Lecturers:</b> RNDr. Marek Nagy, PhD.					
<b>Last change:</b> 20.06.2022					
<b>Approved by:</b> doc. RNDr. Damas Gruska, PhD.					

## COURSE DESCRIPTION

<b>Academic year:</b> 2025/2026					
<b>University:</b> Comenius University Bratislava					
<b>Faculty:</b> Faculty of Mathematics, Physics and Informatics					
<b>Course ID:</b> FMFI.KDMFI/1-AIN-168/22		<b>Course title:</b> Web Applications in Praxis			
<b>Educational activities:</b> <b>Type of activities:</b> lecture / practicals <b>Number of hours:</b> <b>per week:</b> 2 / 2 <b>per level/semester:</b> 26 / 26 <b>Form of the course:</b> on-site learning					
<b>Number of credits:</b> 4					
<b>Recommended semester:</b> 5.					
<b>Educational level:</b> I., II.					
<b>Prerequisites:</b>					
<b>Course requirements:</b>					
<b>Learning outcomes:</b>					
<b>Class syllabus:</b>					
<b>Recommended literature:</b>					
<b>Languages necessary to complete the course:</b>					
<b>Notes:</b>					
<b>Past grade distribution</b> Total number of evaluated students: 336					
A	B	C	D	E	FX
38,1	19,05	15,77	14,29	8,04	4,76
<b>Lecturers:</b> doc. RNDr. Martin Homola, PhD., Mgr. Martin Krupa, Mgr. Robert Mráz, Mgr. Ing. Matúš Tuna, PhD., RNDr. Endre Hamerlik, PhD., PhDr. Ing. Tomáš Gál, PhD.					
<b>Last change:</b> 04.03.2022					
<b>Approved by:</b> doc. RNDr. Damas Gruska, PhD.					



## COURSE DESCRIPTION

<b>Academic year:</b> 2025/2026					
<b>University:</b> Comenius University Bratislava					
<b>Faculty:</b> Faculty of Mathematics, Physics and Informatics					
<b>Course ID:</b> FMFI.KAI/1-AIN-318/23		<b>Course title:</b> XP: Clean code, refactorization, legacy code			
<b>Educational activities:</b> <b>Type of activities:</b> seminar <b>Number of hours:</b> <b>per week:</b> 2 <b>per level/semester:</b> 26 <b>Form of the course:</b> on-site learning					
<b>Number of credits:</b> 3					
<b>Recommended semester:</b> 6.					
<b>Educational level:</b> I.					
<b>Prerequisites:</b>					
<b>Course requirements:</b>					
<b>Learning outcomes:</b>					
<b>Class syllabus:</b>					
<b>Recommended literature:</b>					
<b>Languages necessary to complete the course:</b>					
<b>Notes:</b>					
<b>Past grade distribution</b> Total number of evaluated students: 0					
A	B	C	D	E	FX
0,0	0,0	0,0	0,0	0,0	0,0
<b>Lecturers:</b> Ing. František Gyarfaš, CSc.					
<b>Last change:</b> 23.08.2023					
<b>Approved by:</b> doc. RNDr. Damas Gruska, PhD.					

## COURSE DESCRIPTION

<b>Academic year:</b> 2025/2026	
<b>University:</b> Comenius University Bratislava	
<b>Faculty:</b> Faculty of Mathematics, Physics and Informatics	
<b>Course ID:</b> FMFI.KAI/1-AIN-232/22	<b>Course title:</b> Year project and introduction to bachelor thesis
<b>Educational activities:</b> <b>Type of activities:</b> independent work <b>Number of hours:</b> <b>per week: 1 per level/semester: 13</b> <b>Form of the course:</b> on-site learning	
<b>Number of credits:</b> 2	
<b>Recommended semester:</b> 4.	
<b>Educational level:</b> I.	
<b>Prerequisites:</b>	
<b>Course requirements:</b> Exam: evaluation of the document. Evaluation scale: A 92% (excellent document) B 84% (very-well written document) C 76% (well-written document) D 68% (satisfactory written document) E 60% (sufficient document) Scale of assessment (preliminary/final): 0/100	
<b>Learning outcomes:</b> Students will encounter for the first time the design and implementation of a larger software project or their own research, in the case of a theoretically focused project. They will acquire the ability to independently prepare a technical publication, they will get acquainted with the principles of technical writing, with the required structure of the Bachelor's thesis, with the literature and citing, etc.	
<b>Class syllabus:</b> The student chooses a topic either in agreement with one of the teachers or from a list of free topics for year projects. He carries out the work on the project in cooperation with this teacher. The project can serve as a preparation for the Bachelor's thesis, so the student through this project can begin to meet the objectives of their Bachelor's thesis and then use the project as a basis for the final work. The output of the project is a written work with a structure similar to a Bachelor's thesis with a smaller scope.	
<b>Recommended literature:</b>	
<b>Languages necessary to complete the course:</b> Slovak, English	
<b>Notes:</b>	

<b>Past grade distribution</b>					
Total number of evaluated students: 832					
A	B	C	D	E	FX
44,35	17,43	11,9	6,37	6,01	13,94
<b>Lecturers:</b> Mgr. Júlia Pukancová, PhD., doc. RNDr. Damas Gruska, PhD., RNDr. Zuzana Berger Haladová, PhD.					
<b>Last change:</b> 07.02.2023					
<b>Approved by:</b> doc. RNDr. Damas Gruska, PhD.					