Course descriptions

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COURSE DESCRIPTION

Academic year: 2022/2023

University: Comenius University Bratislava

Faculty: Faculty of Mathematics, Physics and Informatics

Course ID:	**Course title:**
FMFI.KAI/2-AINa-137/20	Artificial Intelligence

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

Number of credits: 6

Recommended semester: 2.

Educational level: II.

Prerequisites:

Antirequisites: FMFI.KAI/2-AIN-137/15

Course requirements:

Learning outcomes:

Class syllabus:

Recommended literature:

Languages necessary to complete the course:

Notes:

Past grade distribution
Total number of evaluated students: 6

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

Lecturers: doc. RNDr. Mária Markošová, PhD.

Last change: 16.11.2021

Approved by:

COURSE DESCRIPTION

Academic year: 2022/2023

University: Comenius University Bratislava

Faculty: Faculty of Mathematics, Physics and Informatics

Course ID:	**Course title:**
FMFI.KAI/2-IKVa-191/19	Cognitive Biology

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

Number of credits: 5

Recommended semester: 2., 4.

Educational level: II.

Prerequisites:

Course requirements:
Three assignments, each for max. 25 points (minimum 10 required), active involvement during course / discussion, max. 25 points (min. 20 required). Course total = 100 points (min. 51 required) Scale of assessment (preliminary/final): 75:25

Learning outcomes:
This course provides a comprehensive overview of principles of cognition, seen as a natural biological phenomenon. The main objective is the formulation of substantiated interrelation of cognition and evolution. The interdisciplinarity of research in cognitive biology requires students to think multi-disciplinary and on multiple scales.

Class syllabus:
1. A Brief History of Cognitive Biology
2. The Underlying Principles of Cognitive Biology:
3. The Basal Level of Cognition:
Molecular Mechanisms,
Concept of Information; Biosemiotics
4. The Medial Level of Cognition:
Cellular Communication, Neural Networks;
5. The Apical Level of Cognition:
Organismal Behavior; “Rationality”; Goal-directedness; Emotions; Mechanisms for Learning & Memory; Brain Modularity;
6. The Ontic Level of Cognition: Developmental Processes I:
Developmental Genetics; Gene Regulatory Networks; Epigenetic Landscape;
7. The Ontic Level of Cognition: Developmental Processes II:
Generative Entrenchment & Ratchet Effects; Developmental Constraints; Hierarchical Processing
8. The Supra-Individual Level of Cognition:
From Eliminative Reductionism to Organicism; Social Cognition; Evolution of Complex Systems;
9. Resumé & Outlook

Recommended literature:

Kováč L. (2015) Closing Human Evolution/Springer, https://goo.gl/Wo2ZRg
Kováč L. (2000) Fundamental principles of cognitive biology. Evolution and Cognition, 6, 51-69
Baluška F., Mansuso S. (2009) Deep evolutionary origins of neurobiology. Communicative & Integrative Biology, :1, 60-65
other research papers

Languages necessary to complete the course:
English

Notes:

Past grade distribution
Total number of evaluated students: 25

A	B	C	D	E	FX
84,0	12,0	4,0	0,0	0,0	0,0

Lecturers: Priv.-Doz. Dr. Isabella Sarto-Jackson, PhD.

Last change: 25.01.2021

Approved by:

STATE EXAM DESCRIPTION

Academic year: 2022/2023	
University: Comenius University Bratislava	
Faculty: Faculty of Mathematics, Physics and Informatics	
Course ID: FMFI.KAI/2-IKVa-956/18	**Course title:** Cognitive Phenomena
Number of credits: 2	
Educational level: II.	
Learning outcomes: The student will become familiar with connections between pieces of knowledge within individual disciplines in the context of selected cognitive phenomena.	
Class syllabus: The course lists a number of cognitive phenomena, that can be looked from the perspective of psychology, computation and neuroscience.	
State exam syllabus: Perception Attention Memory Language Mental representations Learning Embodiment Emotions Social cognition Consciousness	
Recommended literature: Study materials from relevant courses of the program curriculum and various sources to individuals questions, will be provided at course website.	
Last change: 11.05.2021	
Approved by:	

COURSE DESCRIPTION

Academic year: 2022/2023

University: Comenius University Bratislava

Faculty: Faculty of Mathematics, Physics and Informatics

Course ID:	**Course title:**
FMFI.KAI/2-IKVa-113/18	Cognitive Psychology

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

Number of credits: 5

Recommended semester: 2.

Educational level: II.

Prerequisites:

Course requirements:
Seminar project 30% (includes a demonstration and/or practical exercise)
Seminar reading 10% (empirical paper from cognitive psychology)
Midterm test 20%
Final test 40%
Active participation +/- 10%
Scale of assessment (preliminary/final): During course: midterm and two seminar projects (30+10+20) = 60%Examination period: final exam 40%.

Learning outcomes:
In this course, students of cognitive science will be introduced to the field of cognitive psychology, including topics pertaining to perception, attention, memory and other higher-order cognitive processes. Neurobiological underpinnings of such cognitive phenomena and processes will be provided to facilitate the interdisciplinary understanding of human cognition. Students will learn to work independently (and in groups), assess scientific articles and search in scientific databases, critically read theoretical and empirical papers, review scientific sources, and present topics of their interest.

Class syllabus:
[1] Sensation & Perception
[2] Attention
[3] Short-term memory
[4] Working memory and Executive functioning
[5] Long-term memory (Episodic, Semantic)
[6] Mental representation
[7] Language
[8] Cognition & Emotion
[9] Thinking & Reasoning

Recommended literature:
Cognitive Psychology (Sternberg, 2012)

Cognitive Science: An Introduction to the Study of Mind (Friedenberg & Silverman,)
Memory (Baddeley, Keysenck, Anderson, 2015)
Stevens' Handbook of Experimental Psychology: Methodology in Experimental Psychology (Pashler & Wixted, 2002)

Languages necessary to complete the course:
English / Slovak

Notes:

Past grade distribution
Total number of evaluated students: 56

A	B	C	D	E	FX
32,14	30,36	23,21	7,14	3,57	3,57

Lecturers: Mgr. Martin Marko, PhD.

Last change: 06.12.2020

Approved by:

COURSE DESCRIPTION

Academic year: 2022/2023

University: Comenius University Bratislava

Faculty: Faculty of Mathematics, Physics and Informatics

Course ID:	**Course title:**
FMFI.KAI/2-IKVa-187/18	Cognitive Science Seminar

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

Number of credits: 2

Recommended semester: 1.

Educational level: II.

Prerequisites:

Recommended prerequisites:
None.

Course requirements:
Active participation in lectures (50%), writing two reflections (50%).
Scale of assessment (preliminary/final): Grading: 91-100% = A, 81-90% = B, 71-80% = C, 61-70% = D, 51-60% = E, else Fx.

Learning outcomes:
After the course, the students will have acquired knowledge about cognitive science related research topics in our area, which could help them decide for a topic for their semester project (2nd semester), and/or master thesis (4th semester).

Class syllabus:
The seminar consists of a series of lectures by experts, on cognitive science related research topics. The students choose two topics for which they write a critical reflection.

Recommended literature:

Languages necessary to complete the course:

Notes:

Past grade distribution
Total number of evaluated students: 69

A	B	C	D	E	FX
39,13	34,78	14,49	7,25	1,45	2,9

Lecturers: prof. Ing. Igor Farkaš, Dr.

Last change: 27.12.2021

Approved by:

COURSE DESCRIPTION

Academic year: 2022/2023

University: Comenius University Bratislava

Faculty: Faculty of Mathematics, Physics and Informatics

Course ID:	**Course title:**
FMFI.KAI/2-IKV-190/16	Cognitive Science and Artificial Intelligence Seminar

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

Number of credits: 1

Recommended semester: 2., 4.

Educational level: II.

Prerequisites:

Course requirements:

Learning outcomes:

Class syllabus:

Recommended literature:

Languages necessary to complete the course:

Notes:

Past grade distribution
Total number of evaluated students: 3

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

Lecturers: prof. Ing. Igor Farkaš, Dr.

Last change: 23.09.2017

Approved by:

COURSE DESCRIPTION

Academic year: 2022/2023

University: Comenius University Bratislava

Faculty: Faculty of Mathematics, Physics and Informatics

Course ID:	**Course title:**
FMFI.KAI/2-IKVa-232/19	Cognitive Semantics and Cognitive Theory of Representation

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

Number of credits: 5

Recommended semester: 3.

Educational level: II.

Prerequisites:

Course requirements:
During semester: reading assignments, discussions in the class, discussion moderation, peer activity (80%)
Final: written integration reflection (20%)
Scale of assessment (preliminary/final): 80%/20%

Learning outcomes:
Students will gain knowledge of existing theories and conceptual apparatus for analysing meaning and understanding in animals, humans and artificial systems.

Class syllabus:
The goal of the course is to formulate questions and provide views from literature helping to understand how cognitive systems manipulate with meanings. Also, to present cognitive theories of representation bridging the gaps between brain, language and culture.

Recommended literature:
Papers will be provided on the course webpage.

Languages necessary to complete the course:
English

Notes:

Past grade distribution
Total number of evaluated students: 66

A	B	C	D	E	FX
57,58	31,82	4,55	4,55	0,0	1,52

Lecturers: doc. RNDr. Martin Takáč, PhD.

Last change: 07.12.2020

Approved by:

COURSE DESCRIPTION

Academic year: 2022/2023

University: Comenius University Bratislava

Faculty: Faculty of Mathematics, Physics and Informatics

Course ID:	**Course title:**
FMFI.KAI/2-IKVa-136/18	Computational Cognitive Neuroscience

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

Number of credits: 6

Recommended semester: 2.

Educational level: II.

Prerequisites:

Course requirements:
Each student gives 2 presentations - one during one of the lectures and one during one of the labs. The lecture presentation is based on a scientific paper related to the lecture topic. The lab presentation is related to the particular lab exercise. Students choose topics and dates of their presentations at the beginning of the course. There is also a computational project, usually due by the end of a semester. The final written exam is compulsory.
Scale of assessment (preliminary/final): Each of the 2 presentation is worth max. 20%, a project is worth 20% max, total 60%. Final written exam 40% max. Evaluation scale: A 91 – 100 %, B 81 – 90 %, C 73 – 80 %, D 66 – 72 %, E 60 – 65 %, Fx < 60%

Learning outcomes:
After passing this course, students will be familiar with the main theories and approaches of Computational cognitive neuroscience. They will gain an insight of how cognitive processes are affected and controlled by neural circuits in the brain. Students will become familiar with modeling of some basic mechanisms of cognitive functions using the Emergent simulator.

Class syllabus:
1. Introduction to computational cognitive neuroscience. Main concepts in modeling.
2. Spiking neurons models. Biology of individual neuron and its implementation in Emergent.
3. Structure of cortical networks, localist and distributed representations, excitation and inhibion of neurons.
4. Biological mechanism of memory and learning, long-term potentiation and depression of synaptic efficacy.
5. Self-organization, error-driven learning, combination of both.
6. Functional organization of the brain. Overview of brain areas.
7. Visual perception, attention, bottom-up and top-down mechanisms. Spatial neglect.
8. Motor control and reinforcement learning.
9. Memory, memory types, memory phenomena.
10. Language: neurobiology, syntax, semantics, modeling.
11. Executive functions, the role of prefrontal cortex.
12. Agency, theory of mind, self-awareness.

Recommended literature:
O'Reilly, R.C. et al. (2016). Computational Cognitive Neuroscience. Wiki Book. https://grey.colorado.edu/CompCogNeuro/index.php/CCNBook/Main

Languages necessary to complete the course:
English

Notes:

Past grade distribution
Total number of evaluated students: 44

A	B	C	D	E	FX
47,73	22,73	11,36	13,64	2,27	2,27

Lecturers: prof. RNDr. Ľubica Beňušková, PhD., RNDr. Kristína Malinovská, PhD.

Last change: 23.01.2019

Approved by:

COURSE DESCRIPTION

Academic year: 2022/2023

University: Comenius University Bratislava

Faculty: Faculty of Mathematics, Physics and Informatics

Course ID:	**Course title:**
FMFI.KAI/2-IKV-188/16	Computational Neuroscience

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

Number of credits: 5

Recommended semester: 2., 4.

Educational level: II.

Prerequisites:

Course requirements:
Work on home assignments and sitting the final written exam. Students are required to achieve at least half of marks from home assignments during the semester in order to be admitted to sit the final exam. The final exam is compulsory.
Scale of assessment (preliminary/final): Home assignments 50%, final written exam 50%.Grading: A 91-100%, B 81-90%, C 71-80%, D 61-70%, E 51-60%, Fx < 51%

Learning outcomes:
The course will provide students with the basics of computational neuroscience including the basics of the programming metalanguage of the software NEURON, which is used e.g. in the Blue Brain project. The students will learn theoretical and practical principles of application of informatics to the study of processes in neurons and small neural networks. At the same time, they will become familiar with the way of critical thinking, reasoning and problem solving in this research area.

Class syllabus:
- Principles of mathematical and computational modeling of dynamic systems
- Theory of action potentials in neurons and their implementation in NEURON
- Theory of signal processing in dendrites and implementation of dendrites in NEURON
- Theory of biological neural networks and connecting the neurons in NEURON
- Theory of synaptic transmission and implementation of synapses in NEURON
- Implementation of ion channels in NEURON
- Theories of coding of information in neural networks

Recommended literature:
1 – Sterratt D, Graham B, Gillies A and Willshaw D (2011) Principles of Computational Modelling in Neuroscience. Cambridge University Press, Cambridge, U.K. (http://www.biologia.buap.mx/ANTOLOGIA%20BIOFISICA%20I.pdf)
2 – SCHOLARPEDIA - the free online encyclopedia of computational neuroscience (http://www.scholarpedia.org/article/Encyclopedia_of_computational_neuroscience)
3 – Gillies A and Sterratt D (2012) NEURON Tutorial – available online (http://web.mit.edu/neuron_v7.4/nrntuthtml/index.html)

Languages necessary to complete the course:
English, Slovak

Notes:
minimal number of enrolled students = 4

Past grade distribution
Total number of evaluated students: 6

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

Lecturers: prof. RNDr. Ľubica Beňušková, PhD.

Last change: 24.01.2019

Approved by:

COURSE DESCRIPTION

Academic year: 2022/2023

University: Comenius University Bratislava

Faculty: Faculty of Mathematics, Physics and Informatics

Course ID:	**Course title:**
FMFI.KAI/2-IKVa-141/18	Current Trends in Cognitive Psychology

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

Number of credits: 5

Recommended semester: 2.

Educational level: II.

Prerequisites:

Course requirements:
Semester: Active participation (20%) Final essay / Project (80%)
Scale of assessment (preliminary/final): 20 % Seminary, 80 % Final Essay or Project

Learning outcomes:

Class syllabus:
Objectives of this course is to provide insight into current topics in Cognitive Psychology. This include the relation between psychology and ethology, contemporary approches to Intelligence and decision making, Cognitive illusions and biases and emotionality.

Recommended literature:

Languages necessary to complete the course:
English

Notes:

Past grade distribution
Total number of evaluated students: 16

A	B	C	D	E	FX
81,25	0,0	6,25	6,25	0,0	6,25

Lecturers: PhDr. Ing. Tomáš Gál, PhD.

Last change: 11.12.2020

Approved by:

COURSE DESCRIPTION

Academic year: 2022/2023

University: Comenius University Bratislava

Faculty: Faculty of Mathematics, Physics and Informatics

Course ID:	**Course title:**
FMFI.KAI/2-IKVa-239/22	Deep Learning and Cognition

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

Number of credits: 5

Recommended semester: 3.

Educational level: II.

Prerequisites:

Course requirements:
weekly activity during the semester, paper presentation and discussion moderation, final group presentation
Scale of assessment (preliminary/final): 80/20

Learning outcomes:
The course introduces the field of a highly popular machine learning approach focused on deep learning in artificial neural networks. Aiming at master's students with diverse backgrounds of bachelor's studies (such as students of cognitive science), the course will guide them through different areas of DL, to highlight its successful applications. To better understand the mechanistic principles of DL models, the students will learn the basics about the underlying mathematical concepts of DL and will be shown a few simpler examples of functioning neural network models. Throughout the course, the discussions will also focus on virtues and vice of deep learning and its relation to human cognition.

Class syllabus:
Introduction to human intelligence and artificial intelligence
Brief introduction to math needed for DL
Current hype in deep learning
Deep learning in computer vision
Deep learning in natural language processing
Deep learning for robotics
Deep reinforcement learning - how to act
Attention in psychology, neuroscience and machine learning
Multimodal models
Going beyond deep learning
Toward cognitive AI
Integrative summary

Recommended literature:

Arulkumaran K., Deisenroth M.P.,Brundage M., Bharath A.A. (2017) Brief Survey of Deep Reinforcement Learning. IEEE Signal Processing Magazine, https://arxiv.org/pdf/1708.05866.pdf
DeepLearning.AI (2023). A Complete Guide to Natural Language Processing. https://www.deeplearning.ai/resources/natural-language-processing/
Huang S. et al. (2023): Language Is Not All You Need: Aligning Perception with Language Models. https://arxiv.org/pdf/2302.14045.pdf
Korteling J.E. et al. (2021) Human- versus Artificial Intelligence. Frontiers in Artificial Intelligence, 4, https://www.frontiersin.org/articles/10.3389/frai.2021.622364
Lindsay G.W. (2020). Attention in Psychology, Neuroscience, and Machine Learning. Frontiers in Computational Neuroscience, 14, https://doi.org/10.3389/fncom.2020.00029
Lindsay G.W. (2021) Convolutional Neural Networks as a Model of the Visual System: Past, Present, and Future. Journal of Cognitive Neuroscience, 33(10): 2017–2031, https://doi.org/10.1162/jocn_a_01544
Garnelo, M. and Shanahan, M. (2019): Reconciling deep learning with symbolic artificial intelligence: representing objects and relations. Current Opinion in Behavioral Sciences, 29(17), 2352-1546, https://doi.org/10.1016/j.cobeha.2018.12.010
Perconti P., Plebe A. (2020) Deep learning and cognitive science. Cognition, 203, https://doi.org/10.1016/j.cognition.2020.104365
Silver, D., Huang, A., Maddison, C. et al. (2016) Mastering the game of Go with deep neural networks and tree search. Nature, 529, 484–489, https://doi.org/10.1038/nature16961
Sünderhauf N, Brock O, Scheirer W, et al. (2018) The limits and potentials of deep learning for robotics. The International Journal of Robotics Research, 37(4-5), 405-420, https://doi.org/10.1177/0278364918770733
Zhu Y. et al. (2020): Dark, Beyond Deep: A Paradigm Shift to Cognitive AI with Humanlike Common Sense. Engineering, 6(3), pp. 310-345, https://doi.org/10.1016/j.eng.2020.01.011.

Languages necessary to complete the course:
English

Notes:

Past grade distribution
Total number of evaluated students: 15

A	B	C	D	E	FX
46,67	40,0	13,33	0,0	0,0	0,0

Lecturers: prof. Ing. Igor Farkaš, Dr.

Last change: 08.09.2023

Approved by:

COURSE DESCRIPTION

Academic year: 2022/2023

University: Comenius University Bratislava

Faculty: Faculty of Mathematics, Physics and Informatics

Course ID:	**Course title:**
FMFI.KAI/2-ERAa-010/19	Elective Mobility Course

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

Number of credits: 5

Recommended semester: 3.

Educational level: II.

Prerequisites:

Course requirements:

Learning outcomes:

Class syllabus:

Recommended literature:

Languages necessary to complete the course:

Notes:

Past grade distribution
Total number of evaluated students: 17

A	B	C	D	E	FX
47,06	29,41	11,76	5,88	0,0	5,88

Lecturers:

Last change:

Approved by:

COURSE DESCRIPTION

Academic year: 2022/2023

University: Comenius University Bratislava

Faculty: Faculty of Mathematics, Physics and Informatics

Course ID:	**Course title:**
FMFI.KAI/2-IKVa-116/18	Empirical Research Methodology

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

Number of credits: 4

Recommended semester: 1.

Educational level: II.

Prerequisites:

Recommended prerequisites:
None.

Course requirements:
At least 50% of the points within each of the 5 items of evaluation.
Scale of assessment (preliminary/final): 1. Course assignments – 20%2. Semestral project: preliminary text – 10%3. Semestral project: full paper – 30%4. Semestral project: presentation – 10%5. Final “open-book“ exam – 30%

Learning outcomes:
Students will acquire knowledge and skills in the field of quantitative, primarily experimental research: from design, through implementation, to data analysis, reporting, and interpretation of findings. After this course, students should be able to (critically) analyze research studies. Course will also provide practical experience with conducting own experiment, including basic statistical analysis.

Class syllabus:
I. BEFORE EXPERIMENTING
1. Course introduction.
2. Variables and operationalization.
3. Deriving and testing research hypotheses.
4. Population and research sample. Generalization. Research ethics.
5. IMRaD. Sections of research report.
II. EXPERIMENTING
6. Research design. Introduction to experimental design.
7. Experimental and quasi-experimental design.
8. Data analysis: applied statistics I.
9. Significance testing.
10. Data analysis: applied statistics II.
III. AFTER EXPERIMENTING
11. How to write. How to present.

12. Final “open-book“ exam

Recommended literature:

American Psychological Association (2010). Publication Manual of the American Psychological Association. Washington: American Psychological Association.
Cooper, H. (2010). Reporting Research in Psychology. How to meet Journal Article Reporting Standards. Washington: American Psychological Association.
Field, A. (2005). Discovering statistics using SPSS. London: Sage Publications.
Gould J. C. (2002). Concise Handbook of Experimental Methods for the Behavioral and Biological Sciences. London: CRC Press.
Harris, P. (2008). Designing and reporting experiments in psychology. Berkshire: McGraw-Hill.
Sani, F., & Todman, J. (2006). Experimental Design and Statistics for Psychology. A First Course. Oxford: Blackwell Publishing.

Languages necessary to complete the course:

Notes:

Past grade distribution

Total number of evaluated students: 45

A	B	C	D	E	FX
33,33	31,11	20,0	8,89	6,67	0,0

Lecturers: Mgr. Xenia Daniela Poslon, PhD.

Last change: 21.09.2018

Approved by:

COURSE DESCRIPTION

Academic year: 2022/2023

University: Comenius University Bratislava

Faculty: Faculty of Mathematics, Physics and Informatics

Course ID:	**Course title:**
FMFI.KAI/2-IKVa-105/20	Fundamentals of Programming

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

Number of credits: 5

Recommended semester: 1.

Educational level: II.

Prerequisites:

Course requirements:

Learning outcomes:

Class syllabus:

Recommended literature:

Languages necessary to complete the course:

Notes:

Past grade distribution
Total number of evaluated students: 35

A	B	C	D	E	FX
48,57	31,43	8,57	2,86	5,71	2,86

Lecturers: RNDr. Kristína Malinovská, PhD., Mgr. Matej Fandl

Last change: 28.08.2021

Approved by:

COURSE DESCRIPTION

Academic year: 2022/2023

University: Comenius University Bratislava

Faculty: Faculty of Mathematics, Physics and Informatics

Course ID:	**Course title:**
FMFI.KAI/2-IKVa-236/19	Grounded Cognition

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

Number of credits: 5

Recommended semester: 3.

Educational level: II.

Prerequisites:

Course requirements:
weekly activity during the semester, paper presentation and discussion moderation, final paper presentation and writing
Scale of assessment (preliminary/final): 70/30

Learning outcomes:
The course objective is to provide students with deeper insight into up-to-date research trends in cognitive science, from the perspective of various disciplines (psychological, neural and computational). The course focus is on grounded (embodied) cognition, and its relation to language. The course should also help students in their ability to interpret scientific papers, to formulate, present and defend ideas. The course is primarily taken by mobility students in cognitive science.

Class syllabus:
1. Introduction to language and concepts
2. Towards embodied cognition
3. Mirror neuron system and its role(s) in cognition
4. Common coding theory, motor simulation, mental simulation
5. Language as action
6. Conceptual and linguistic systems - two theories
7. Meaning as statistical covariation
8. Symbol grounding problem
9. Unification attempts
10. Role(s) of language in cognition and thought
11. Grounding abstract concepts.
12. Summary and reflection.

Recommended literature:
various journal papers related to individual topics

Languages necessary to complete the course:
English

Notes:

Past grade distribution
Total number of evaluated students: 49

A	B	C	D	E	FX
32,65	42,86	14,29	6,12	4,08	0,0

Lecturers: prof. Ing. Igor Farkaš, Dr.

Last change: 08.12.2020

Approved by:

COURSE DESCRIPTION

Academic year: 2022/2023

University: Comenius University Bratislava

Faculty: Faculty of Mathematics, Physics and Informatics

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

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

Number of credits: 5

Recommended semester: 1.

Educational level: II.

Prerequisites:

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

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

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

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

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

Languages necessary to complete the course:
English

Notes:

Past grade distribution
Total number of evaluated students: 6

A	B	C	D	E	FX
66,67	0,0	0,0	0,0	33,33	0,0

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

Last change: 22.06.2022

Approved by:

COURSE DESCRIPTION

Academic year: 2022/2023

University: Comenius University Bratislava

Faculty: Faculty of Mathematics, Physics and Informatics

Course ID:	**Course title:**
FMFI.KAI/2-IKVa-121/18	Introduction to Cognitive Science

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

Number of credits: 6

Recommended semester: 1.

Educational level: II.

Prerequisites:

Course requirements:
Readings 25%
Short oral presentations 15%
Paper 30%
Paper peer review 10%
Group work & colloquium 10%
Integration reflection 10%
Scale of assessment (preliminary/final): 50/50

Learning outcomes:
Content-wise, the students will learn about:
History, theories, methods and topics of cognitive science
Disciplines of cognitive science, their specific contributions
Representational paradigms
Cognitive modeling
Ethical aspects of cognitive science and technologies
Method-wise, the students will acquire the following skills:
Think in an interdisciplinary way, appreciate multiple perspectives.
Search and critically evaluate scientific knowledge sources.
Critically read papers of different disciplines/styles.
Orally present topics of interest.
Learn about academic honesty practices and plagiarism.
Write a scientific paper and cite literature properly.
Review their peer's paper.
Work independently, participate in discussions.

Class syllabus:
History, object and methods of cognitive science. Representational paradigms: functionalism, cognitivism, connectionism, embodiment, dynamical systems. Computational modeling. Neuroscience. Ethical aspects of research in cognitive science.

Recommended literature:

Silverman G., Friedenberg J. (2011): Cognitive science. An introduction to the study of mind. SAGE.
Thagard, P. (2005): Mind: Introduction to Cognitive Science, 2nd Edition. MIT Press.
Stainton, J.R (2006): Contemporary Debates in Cognitive Science. Wiley.
Bermúdez, J. L.(2014): Cognitive science. An introduction to the science of the mind. Cambridge University Press.

Languages necessary to complete the course:

English

Notes:

Past grade distribution

Total number of evaluated students: 69

A	B	C	D	E	FX
43,48	27,54	17,39	10,14	0,0	1,45

Lecturers: doc. RNDr. Martin Takáč, PhD., Mgr. Matej Fandl

Last change: 21.09.2018

Approved by:

COURSE DESCRIPTION

Academic year: 2022/2023

University: Comenius University Bratislava

Faculty: Faculty of Mathematics, Physics and Informatics

Course ID:	**Course title:**
FMFI.KAI/2-IKVa-115/18	Introduction to Computational Intelligence

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

Number of credits: 6

Recommended semester: 1.

Educational level: II.

Prerequisites:

Recommended prerequisites:
None.

Course requirements:
Grading: 91-100% = A, 81-90% = B, 71-80% = C, 61-70% = D, 51-60% = E, else Fx.
Scale of assessment (preliminary/final): Active participation during the semester (max. 14 points).Written mid-term test (max. 12 points).Final written-oral exam (max. 24 points).

Learning outcomes:
The course objectives are to make the students familiar with basic principles of various computational methods of data processing that can commonly be called computational intelligence (CI). This includes mainly bottom-up approaches to solutions of (hard) problems based on various heuristics (soft computing), rather than exact approaches of traditional artificial intelligence based on logic (hard computing). Examples of CI are nature-inspired methods (artificial neural networks, evolutionary algorithms, fuzzy systems), as well as probabilistic methods and reinforcement learning. After the course the students will be able to conceptually understand the important terms and algorithms of CI, and choose appropriate method(s) for a given task. The theoretical introduction is combined with practical examples.

Class syllabus:

Recommended literature:
Craenen B., Eiben A. (2003): Computational Intelligence. In: Encyclopedia of Life Support Sciences, EOLSS Publishers Co.
Engelbrecht A. (2007). Computational Intelligence: An Introduction (2nd ed.), John Willey & Sons. Available in faculty library.
Russell S., Norwig P. (2010). Artificial Intelligence: A Modern Approach, (3rd ed.), Prentice Hall. Available in the faculty library.
Marsland S. (2015). Machine Learning: An Algorithmic Perspective, (2nd ed.), CRC Press.
Woergoetter F., Porr B. (2008). Reinforcement learning, Scholarpedia, 3(3):1448.
Zadeh L. (2007). Fuzzy logic, Scholarpedia, 3(3):1766.

Languages necessary to complete the course:

Notes:

Past grade distribution
Total number of evaluated students: 83

A	B	C	D	E	FX
30,12	15,66	19,28	12,05	18,07	4,82

Lecturers: prof. Ing. Igor Farkaš, Dr., RNDr. Kristína Malinovská, PhD.

Last change: 01.09.2018

Approved by:

COURSE DESCRIPTION

Academic year: 2022/2023

University: Comenius University Bratislava

Faculty: Faculty of Mathematics, Physics and Informatics

Course ID:	**Course title:**
FMFI.KAI/2-IKVa-123/18	Introduction to Neuroscience

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

Number of credits: 5

Recommended semester: 1.

Educational level: II.

Prerequisites:

Course requirements:

Learning outcomes:

Class syllabus:
Neuro-immuno-endocrine regulation of human body.
Gross functional anatomy of the nervous system, the brain as the main regulatory organ.
The role of glial cells. Complex functions of the brain and the brain programmes.
Neuronal signalling. The membrane potential, receptor potential. Nerve impulses, action potential.
Conduction of nerve impulses. Stimulation of nerve fibres, refractory periods.
Overview of neuronal communication, synaptic transmission, the role of myelin.
Developmental physiology of the brain. Neuronal plasticity. Functional organization of neuronal circuits.
Electrocorticogram, electroencephalogram, evoked potentials. Sleep and wakefulness.
Physiology of emotions, behaviour and motivation. Higher nervous functions including memory, learning and speech.
Functional specialization of brain hemispheres and gender dimorphism.

Recommended literature:
Koukolík,F.: Mozek a jeho duše. 3.vyd. Galén, Praha, 2005, 275 s.
Bear, M.F., Connors, B.W., Paradiso, M.A.: Neuroscience – exploring the brain. 2nd ed. Lippincott, Williams and Wilkins, Baltimore, 2001, 855 pp.
Gazzaniga,M.S., Ivry,R.B., Mangun,G.R.: Cognitive neuroscience – the biology of the mind. W.W.Norton, New York, 2002, 681 pp.
Kandel, E.R., Schwartz, J.H., Jessel, T.M.: Principles of Neural Science. 4th ed. McGraw-Hill Medical, 2000, 1414pp.

Languages necessary to complete the course:

Notes:

Past grade distribution Total number of evaluated students: 68					
A	B	C	D	E	FX
29,41	22,06	25,0	16,18	5,88	1,47
Lecturers: prof. MUDr. Daniela Ostatníková, PhD.					
Last change: 19.09.2018					
Approved by:					

COURSE DESCRIPTION

Academic year: 2022/2023

University: Comenius University Bratislava

Faculty: Faculty of Mathematics, Physics and Informatics

Course ID:	**Course title:**
FMFI.KAI/2-IKVa-114/18	Introduction to Philosophy of Mind

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

Number of credits: 5

Recommended semester: 2.

Educational level: II.

Prerequisites:

Course requirements:
Final paper- analytic-critical study (100%)
Grade A: 90% , B: 80% , C 70%, D 60%, and grade E at minimum 50%.

Learning outcomes:
Students acquire knowledge of representative philosophical conceptions, theories and problems within contemporary philosophy of mind. They will be acquainted with main arguments and types of argumentation on the mind/body problem and they will improve their capacity for critical discussion and ability to defend their own attitudes.

Class syllabus:
From the history in studying human mind and consciousness
Basic terminology, concepts: mind, consciousness, reason, mental states, subjectivity, mental causality, self etc.;
Taxonomy of approaches in the study on the nature of mind (dualism, identity theory, functionalism, naturalism etc.);
The concept and problem of consciousness,
Medicine and Philosophy (study of normal and pathological cases)
Impairments of Consciousness – Novel methods of investigating the states of consciousness.
Models and theories of conscious experience.

Recommended literature:
GÁLIKOVÁ, S.: An Introduction to the Philosophy of Mind. Trnava, FFTU, 2013.
MASLIN, K., T.: An Introduction to thePphilosophy of mind. Cambridge, Polity, 2007
BLOCK, N., FLANAGAN, O., GUZELDERE, G. (1996): The Nature of Consciousness: Philosophical and Scientific Debates. Cambridge, MA, MIT Press.
CHALMERS, D. (1996): The Conscious Mind. New York, Oxford University Press.
DENNETT, D. (1991): Consciousness explained. Little, Brown.
CHURCHLAND, P. M. (1995): The Engine of Reason, the Seat of the Soul. Cambridge, MA, MIT Press.
SEARLE, J. (1992): The Rediscovery of Mind. Cambridge, MA, MIT Press.

GÁLIKOVÁ, S.(2013): Philosophy of Consciousness. Towarzystwo Słowaków w Polsce.

Languages necessary to complete the course:
English

Notes:

Past grade distribution
Total number of evaluated students: 56

A	B	C	D	E	FX
73,21	8,93	3,57	1,79	5,36	7,14

Lecturers: prof. PhDr. Silvia Tomašková, PhD.

Last change: 19.02.2024

Approved by:

COURSE DESCRIPTION

Academic year: 2022/2023

University: Comenius University Bratislava

Faculty: Faculty of Mathematics, Physics and Informatics

Course ID:	**Course title:**
FMFI.KAI/2-IKVa-111/18	Introduction to Psychology

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

Number of credits: 4

Recommended semester: 1.

Educational level: II.

Prerequisites:

Recommended prerequisites:
None.

Course requirements:
Seminar project 30% (theoretical assignment, oral presentation)
Seminar reading 10% (presenting a psychological study)
Midterm test 20%
Final test 40%
Active participation +/- 10%
Scale of assessment (preliminary/final): Midterm: written exam (20%) a seminar projects (30%)m seminar reading (10%). Examination period: final written exam (40%). A: 91–100; B: 81–90; C: 73–80; D: 66–72; E: 60–65; Fx: 0–59.

Learning outcomes:
Students will be familiarized with the subject of psychology as a scientific discipline, its main schools (e.g., behaviorism, gestalt psychology, psychoanalysis, cognitive psychology), approaches, and methods used to investigate mind and behavior (e.g., subjective, objective, projective, physiological). Lectures will provide introductory information on fundamental psychological concepts. Students will learn to work independently, read and understand scientific (behavioral) articles, search through scientific databases, review scientific sources, and present topics of their interest.

Class syllabus:
[1] Introductory lecture
[2] Origins and history
[3] What is mind
[4] Biological psychology
[5] Cognitive psychology
[6] Psychological methods
[7] Personality theories
[8] Clinical psychology

[9] Emotions

Recommended literature:
Introduction to Psychology (Kalat, 2008)
An Introduction to the History of Psychology (Hergenhahn & Henley, 2014)
Research in Psychology: Methods and Design (Goodwin, 2009)
Stevens' Handbook of Experimental Psychology: Methodology in Experimental Psychology (Pashler & Wixted, 2002)

Languages necessary to complete the course:
English/Slovak

Notes:

Past grade distribution
Total number of evaluated students: 38

A	B	C	D	E	FX
26,32	34,21	23,68	7,89	7,89	0,0

Lecturers: Mgr. Martin Marko, PhD.

Last change: 05.12.2020

Approved by:

COURSE DESCRIPTION

Academic year: 2022/2023

University: Comenius University Bratislava

Faculty: Faculty of Mathematics, Physics and Informatics

Course ID:	**Course title:**
FMFI.KAI/2-IKVa-138/18	Introduction to Robotics

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

Number of credits: 5

Recommended semester: 2.

Educational level: II.

Prerequisites:

Recommended prerequisites:
basic programming skills in Python

Course requirements:
activity during the semester (project), final written test
Scale of assessment (preliminary/final): 50:50

Learning outcomes:
After competing the course, students will be familiar with the basic concepts of robotics and will have acquired practical skills on how to control the robot in case of simple tasks, either in a simulated environment or with a physical robot. In addition, students will also get the basics of philosophical background of cognitive robotics (cognitivism versus post-cognitivism, empirism versus rationalism).

Class syllabus:
1. Action. Actuators. The robot gear control: via position, via speed. The robot arm control. Forward and inverse kinematics.
2. Perception. Sensors. The basic processing of sensor data: distance, camera image, depth map, tactile map.
3. Control. Decomposition of the control system by function and by activity. Significance of real time.
4. The regular objects recognition. Hough transform.
5. The irregular objects recognition: DOT/HOG, SIFT/SURF/ORB, phase correlation. Representation of objects in robot memory. Sensory-motor approach to perception.
6. Behavioral robotics. Emergence of control in modular control architecture.
7. Cognitive approach to robot control. GOFAI, planning. STRIPS. Sussman's anomaly. Frame problem.
8. Post-cognitive approach to robot control. Dreyfus' criticism of GOFAI. Brooks' subsumption architecture. Situated robots. Embodiment. Interaction principle (robot ACE).
9. Minsky' society model of mind. Inspiration from Piaget's developmental psychology. Dennet's mind types. Robot COG.

10. Intelligence as a social phenomenon in group of robots.
11. Robots recognizing and emulating emotions. Robot KISMET.
12. Cloud technology for robots. Robot Pepper. IBM Watson. MicroSoft Azure.
13. Control emerging from interaction of robot with its environment. Delayed reinforcement learning, Genetic programing, Neural network training.

Recommended literature:

Minsky, M.: Society of Mind, 1986
Brooks, R.: Cambrian Intelligence, 1999
Arkin, R.: Behavior-Based Robotics (Intelligent Robotics and Autonomous Agents), 2000
Floreano, D.: Evolutionary Robotics: The Biology, Intelligence, and Technology of Self-Organizing Machines (Intelligent Robotics and Autonomous Agents series), 2004
Vernon, D.: A Roadmap for Cognitive Development in Humanoid Robots (Cognitive Systems Monographs), 2014
Davies, E.: Computer Vision 5th Edition. Principles, Algorithms, Applications, Learning, 2018

Languages necessary to complete the course:
English, Slovak

Notes:

Past grade distribution
Total number of evaluated students: 31

A	B	C	D	E	FX
16,13	32,26	16,13	9,68	9,68	16,13

Lecturers: RNDr. Andrej Lúčny, PhD., prof. Ing. Igor Farkaš, Dr.

Last change: 16.06.2022

Approved by:

STATE EXAM DESCRIPTION

Academic year: 2022/2023	
University: Comenius University Bratislava	
Faculty: Faculty of Mathematics, Physics and Informatics	
Course ID: FMFI.KAI/2-IKVa-991/18	**Course title:** Master's Thesis
Number of credits: 20	
Educational level: II.	
State exam syllabus:	
Last change:	
Approved by:	

COURSE DESCRIPTION

Academic year: 2022/2023

University: Comenius University Bratislava

Faculty: Faculty of Mathematics, Physics and Informatics

Course ID:	**Course title:**
FMFI.KAI/2-IKVa-921/22	Master's Thesis Seminar

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

Number of credits: 3

Recommended semester: 4.

Educational level: II.

Prerequisites:

Course requirements:
Sumbitting the master's thesis concept, oral presentations in the seminar (shorter and longer), peer activity during the semester, participation in peer reviews of extended abstracts (for the conference), active participation at MEi:CogSci conference (talk).
Scale of assessment (preliminary/final): 40% - quality of the master thesis concept30% - oral presentations about the thesis in the seminar (shorter and longer)20% - activity during the semester, peer feedback, participation in peer reviews of extended abstracts (for the conference)10% - active participation at MEi:CogSci conference (talk)

Learning outcomes:
After the course, you should be able to: (1) to formulate and follow a scientific question relevant to cognitive science, (2) to plan, conduct, document and present scientific work, (3) to write an extended scientific abstract, (4) to defend your research and constructively deal with critical commentary, (5) to constructively participate in a peer-review process, (6) to get involved in collaborative work in physical and virtual environments, (7) to engage in scientific discourse, (8) to communicate your expertise in order to contribute constructive criticism to the work of others.

Class syllabus:
Introduction to the course, requirements and grading, plan for the semester.
Presentations of the student's mobility projects to 1st year students (joint meeting).
Student's short presentations (10 min.). Master Thesis Concept requirement.
Student's short presentations (10 min.).
Long presentations (several students), feedback
Long presentations (several students), feedback
Long presentations (several students), feedback
Interdisciplinarity - requirement for your master thesis.
Rehearsal of conference talks
Presentations (talks) at MEi:CogSci conference (during exam period)

Recommended literature:

Languages necessary to complete the course:

Notes:

Past grade distribution
Total number of evaluated students: 13

A	B	C	D	E	FX
61,54	7,69	30,77	0,0	0,0	0,0

Lecturers: prof. Ing. Igor Farkaš, Dr., RNDr. Barbora Cimrová, PhD.

Last change: 31.05.2022

Approved by:

COURSE DESCRIPTION

Academic year: 2022/2023

University: Comenius University Bratislava

Faculty: Faculty of Mathematics, Physics and Informatics

Course ID:	**Course title:**
FMFI.KAI/2-IKVa-267/18	Mathematical Logic for Cognitive Science

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

Number of credits: 5

Recommended semester: 2.

Educational level: II.

Prerequisites:

Course requirements:

Learning outcomes:

Class syllabus:

Recommended literature:

Languages necessary to complete the course:

Notes:

Past grade distribution
Total number of evaluated students: 37

A	B	C	D	E	FX
24,32	21,62	29,73	16,22	8,11	0,0

Lecturers: prof. RNDr. Pavol Zlatoš, PhD.

Last change:

Approved by:

COURSE DESCRIPTION

Academic year: 2022/2023

University: Comenius University Bratislava

Faculty: Faculty of Mathematics, Physics and Informatics

Course ID:	**Course title:**
FMFI.KDMFI/2-IKVa-102/20	Mathematics for Cognitive Science

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

Number of credits: 5

Recommended semester: 1.

Educational level: II.

Prerequisites:

Course requirements:
To be classified, the student has to achieve at least 50% of each activity: project (15%), weekly exams (40%), middle term exam (15%), final exam (30%).
Scale of assessment (preliminary/final): Grading: A > 90%, B > 80%, C> 70%, D > 60%, E > 52% points.

Learning outcomes:
The lectures will provide students with basics of propositional and predicate logic, linear algebra, mathematical analysis, and probability that are important for the study of informatics and for (computational) cognitive science. At the same time, the students will learn about mathematical culture, notation, way of thinking and expressing oneself.

Class syllabus:
1. Basics of mathematical analysis: functions, differential calculus. 3. Basics of linear algebra: matrices and vectors, operations. 3. Basics of statistics and probability theory.

Recommended literature:
Discrete and combinatorial mathematics: An applied introduction / Ralph P. Grimaldi. Rose-Hulman Institute of Technology: Pearson, 2004. Calculus / Gilbert Strang. Massachusetts Institute of Technology: Wellesley-Cambridge Press Fundamentals of Linear Algebra / James B. Carrell. Canada: University of British Colombia, 2005 Artificial Intelligence: A Modern Approach (3rd ed.) / Stuart Russell and Peter Norvig. The USA: Pearson, 2010

Languages necessary to complete the course:
English

Notes:

Past grade distribution
Total number of evaluated students: 45

A	B	C	D	E	FX
24,44	20,0	24,44	17,78	8,89	4,44

Lecturers: doc. PaedDr. Mária Slavíčková, PhD.
Last change: 16.09.2021
Approved by:

COURSE DESCRIPTION

Academic year: 2022/2023

University: Comenius University Bratislava

Faculty: Faculty of Mathematics, Physics and Informatics

Course ID:	**Course title:**
FMFI.KAI/2-ERAa-001/19	Mobility Project I

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

Number of credits: 10

Recommended semester: 3.

Educational level: II.

Prerequisites:

Course requirements:

Learning outcomes:

Class syllabus:

Recommended literature:

Languages necessary to complete the course:

Notes:

Past grade distribution
Total number of evaluated students: 34

A	B	C	D	E	FX
70,59	11,76	8,82	5,88	2,94	0,0

Lecturers:

Last change:

Approved by:

COURSE DESCRIPTION

Academic year: 2022/2023

University: Comenius University Bratislava

Faculty: Faculty of Mathematics, Physics and Informatics

Course ID:	**Course title:**
FMFI.KAI/2-ERAa-002/19	Mobility Project II

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

Number of credits: 15

Recommended semester: 3.

Educational level: II.

Prerequisites:

Course requirements:

Learning outcomes:

Class syllabus:

Recommended literature:

Languages necessary to complete the course:

Notes:

Past grade distribution
Total number of evaluated students: 27

A	B	C	D	E	FX
66,67	11,11	14,81	7,41	0,0	0,0

Lecturers:

Last change:

Approved by:

COURSE DESCRIPTION

Academic year: 2022/2023

University: Comenius University Bratislava

Faculty: Faculty of Mathematics, Physics and Informatics

Course ID:	**Course title:**
FMFI.KAI/2-ERAa-003/19	Mobility Project III

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

Number of credits: 20

Recommended semester: 3.

Educational level: II.

Prerequisites:

Course requirements:

Learning outcomes:

Class syllabus:

Recommended literature:

Languages necessary to complete the course:

Notes:

Past grade distribution
Total number of evaluated students: 57

A	B	C	D	E	FX
73,68	12,28	12,28	0,0	1,75	0,0

Lecturers:

Last change:

Approved by:

COURSE DESCRIPTION

Academic year: 2022/2023

University: Comenius University Bratislava

Faculty: Faculty of Mathematics, Physics and Informatics

Course ID:	**Course title:**
FMFI.KAI/2-IKVa-137/18	Modern Methods in Brain Research

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

Number of credits: 5

Recommended semester: 2.

Educational level: II.

Prerequisites:

Course requirements:
Grading: 91-100% = A, 81-90% = B, 71-80% = C, 61-70% = D, 51-60% = E, else Fx.
Active participation during the semester: presentations (30%), quick quizzes (10%), EEG practice (10%)
Final exam: written test (50%)
Scale of assessment (preliminary/final): Pomer hodnotenia za semester voči skúške: 50/50

Learning outcomes:
Students will become familiar with the basic imaging and other research methods used in modern cognitive neuroscience and understand the basic principles of use of these methods. They will get acquainted with the possibilities and suitability of their use, as well as with the advantages and disadvantages of each particular method. Theoretical knowledge will be supported by practical demonstrations of recording and analyzing brain activity (especially by using EEG).

Class syllabus:
An overview of examination and imaging methods – their temporal and spatial characteristics. Basics of electroencephalography (EEG). Physical and physiological principles of EEG. Basics of EEG signal analysis. Artifacts in EEG. EEG spectral analysis. Evoked and event-related potentials. Principles of computed tomography (CT), magnetic resonance imaging (MRI), functional magnetic resonance imaging (fMRI), positron emission tomography (PET), transcranial magnetic stimulation (TMS) and other modern methods used in the study of brain structure and function. The course will also include a brief introduction to other methods that do not directly measure brain activity, but rather its peripheral manifestations. These include electrooculography (EOG), electrodermal activity (EDA) or skin conductivity (SCL), electromyography (EMG), electrocardiography (ECG), respiratory rate and more.

Recommended literature:
Biological Imaging and Sensing / T. Furukawa (Ed.). Berlin : Springer, 2004

Languages necessary to complete the course:
English

Notes:

Past grade distribution
Total number of evaluated students: 38

A	B	C	D	E	FX
71,05	18,42	7,89	0,0	2,63	0,0

Lecturers: RNDr. Barbora Cimrová, PhD.

Last change: 04.07.2022

Approved by:

COURSE DESCRIPTION

Academic year: 2022/2023

University: Comenius University Bratislava

Faculty: Faculty of Mathematics, Physics and Informatics

Course ID:	**Course title:**
FMFI.KAI/2-IKV-189/16	Natural Language Processing

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

Number of credits: 6

Recommended semester: 2., 4.

Educational level: II.

Prerequisites:

Course requirements:

Learning outcomes:
The students will acquire knowledge and practical experience in the field of natural language processing. They will know how to effectively apply the underlying theory from probability, statistics, computational linguistics, and machine learning, to perform tasks involving unstructured text, such as spelling correction, text generation, sentiment analysis, information extraction, and question answering.

Class syllabus:
(1) Text Processing.
(2) Language Modeling (n-grams), Spelling Correction.
(3) Text Classification (Naive Bayes), Sentiment Analysis.
(4) Named Entity Recognition (HMM, MaxEnt), Relation Extraction.
(5) POS Tagging, Parsing.
(6) Information Retrieval.
(7) Meaning Extraction, Question Answering.

Recommended literature:
Speech and Language Processing, 2nd Edition / Daniel Jurafsky, James H Martin. Upper Saddle River : Prentice Hall, 2008

Languages necessary to complete the course:
English

Notes:

Past grade distribution
Total number of evaluated students: 40

A	B	C	D	E	FX
67,5	20,0	7,5	0,0	5,0	0,0

Lecturers: Mgr. Marek Šuppa

Last change: 23.09.2017
Approved by:

COURSE DESCRIPTION

Academic year: 2022/2023

University: Comenius University Bratislava

Faculty: Faculty of Mathematics, Physics and Informatics

Course ID:	**Course title:**
FMFI.KAI/2-ERAa-004/19	New Trends in Cognitive Science

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

Number of credits: 10

Recommended semester: 3.

Educational level: II.

Prerequisites:

Course requirements:

Learning outcomes:

Class syllabus:

Recommended literature:

Languages necessary to complete the course:

Notes:

Past grade distribution
Total number of evaluated students: 55

A	B	C	D	E	FX
40,0	41,82	12,73	3,64	1,82	0,0

Lecturers:

Last change:

Approved by:

COURSE DESCRIPTION

Academic year: 2022/2023

University: Comenius University Bratislava

Faculty: Faculty of Mathematics, Physics and Informatics

Course ID:	**Course title:**
FMFI.KAI/2-IKV-238/15	Philosophy of Artificial Intelligence

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

Number of credits: 5

Recommended semester: 3.

Educational level: II.

Prerequisites:

Course requirements:

Learning outcomes:

Class syllabus:

Recommended literature:

Languages necessary to complete the course:

Notes:

Past grade distribution
Total number of evaluated students: 11

A	B	C	D	E	FX
90,91	0,0	0,0	0,0	9,09	0,0

Lecturers: prof. PhDr. Emil Višňovský, CSc.

Last change: 02.06.2015

Approved by:

COURSE DESCRIPTION

Academic year: 2022/2023

University: Comenius University Bratislava

Faculty: Faculty of Mathematics, Physics and Informatics

Course ID:	**Course title:**
FMFI.KAI/2-IKV-167/00	Practical Classes in Robotics

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

Number of credits: 3

Recommended semester: 2.

Educational level: II.

Prerequisites:

Course requirements:
Evaluation during semester: reports or projects (60%), active participation (40%)
Approximate evaluation scale: A 90%, B 80%, C 70%, D 60%, E 50%
Scale of assessment (preliminary/final): 100/0

Learning outcomes:
A student will understand control and programming of robots, processing signals from sensors, he or she will experience preparation and realization of a individual or group project with robotic technologies in a lab with the support of the teacher.

Class syllabus:
Seminar topics will cover: robotic control architectures, probabilistic robotics, multi-robotic systems, evolutionary robotics, sensor systems and actuators, educational robotics, robotic competitions, entertainment robotics, servis robotics, embedded systems.

Recommended literature:
Kortenkamp, Bonasso, Murphy, Artificial Intelligence and Mobile Robots, MIT Press, 1998
Dudek, Jenkin: Computational Principles of Mobile Robotics, Cambridge Univ. Press, 2000
Corrochano, Geometric Computing for Perception Action Systems, Springer, 2001
Arkin, Behavior-Based Robotics, MIT Press, 2000
Tomasi, Mathematical Methods for Robotics and Vision, Stanford University, 2000
Nehmzow, Scientific Methods in Mobile Robotics, Springer, 2006.
Additional papers upon need

Languages necessary to complete the course:

Notes:

Past grade distribution
Total number of evaluated students: 36

A	B	C	D	E	FX
66,67	5,56	19,44	2,78	2,78	2,78

Lecturers: Mgr. Pavel Petrovič, PhD.
Last change: 23.06.2022
Approved by:

COURSE DESCRIPTION

Academic year: 2022/2023

University: Comenius University Bratislava

Faculty: Faculty of Mathematics, Physics and Informatics

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

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

Number of credits: 5

Recommended semester: 2.

Educational level: I., II.

Prerequisites:

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

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

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

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

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

Languages necessary to complete the course:
English

Notes:

Past grade distribution
Total number of evaluated students: 88

A	B	C	D	E	FX
46,59	13,64	13,64	9,09	4,55	12,5

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

Last change: 28.02.2020

Approved by:

COURSE DESCRIPTION

Academic year: 2022/2023

University: Comenius University Bratislava

Faculty: Faculty of Mathematics, Physics and Informatics

Course ID:	**Course title:**
FMFI.KAI/2-IKVa-122/18	Semester Project

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

Number of credits: 6

Recommended semester: 2.

Educational level: II.

Prerequisites:

Course requirements:

Learning outcomes:

Class syllabus:

Recommended literature:

Languages necessary to complete the course:

Notes:

Past grade distribution
Total number of evaluated students: 55

A	B	C	D	E	FX
56,36	23,64	7,27	7,27	3,64	1,82

Lecturers: RNDr. Kristína Malinovská, PhD., Mgr. Xenia Daniela Poslon, PhD.

Last change: 28.08.2021

Approved by:

COURSE DESCRIPTION

Academic year: 2022/2023

University: Comenius University Bratislava

Faculty: Faculty of Mathematics, Physics and Informatics

Course ID:	**Course title:**
FMFI.KAI/2-IKVa-184/19	Social Cognition

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

Number of credits: 5

Recommended semester: 2.

Educational level: II.

Prerequisites:

Course requirements:
Activity during the seminars
Presentation
Final essay
Scale of assessment (preliminary/final): Activity during the seminarsPresentationFinal essayGrading: 91-100% = A, 81-90% = B, 71-80% = C, 61-70% = D, 51-60% = E, else Fx

Learning outcomes:
The course will provide an opportunity to acquire knowledge of some of the main topics and problems in the research of social cognition, especially theory of mind.
The focus of the course will be on the analysis of relevant theoretical and experimental papers.
The course will have an interdisciplinary character – we will discuss influential studies in comparative psychology, developmental psychology, philosophy and other related disciplines.

Class syllabus:
Social cognition in animals and humans.
Intentional stance (D. Dennett).
Shared intentionality. We-mode. Joint action.
Modularity of mind and social cognition.
Theory of mind – „classical“(theory theory, simulation theory) and new trends in the research of mindreading (4E cognition, predictive processing).
Mirror neurons system.
Theory of mind in the brain.
Mindreading and autism.
Social cognition and cultural transmission.
Social cognition and the origins of morality.

Recommended literature:
Carruthers, P., & Smith, P. K. (Eds.). (1996). Theories of theories of mind. Cambridge University Press.

Goldman, A. I. (2006). Simulating minds: The philosophy, psychology, and neuroscience of mindreading. Oxford University Press.
Dennett, D. C. (1989). The intentional stance. MIT press.
Baron-Cohen, S. (1997). Mindblindness: An essay on autism and theory of mind. MIT press.
Banaji, M. R., & Gelman, S. A. (Eds.). (2013). Navigating the social world: What infants, children, and other species can teach us. Oxford University Press.

Languages necessary to complete the course:
English

Notes:

Past grade distribution
Total number of evaluated students: 8

A	B	C	D	E	FX
50,0	37,5	0,0	0,0	12,5	0,0

Lecturers: Mgr. Xenia Daniela Poslon, PhD., Mgr. Barbara Lášticová, PhD.

Last change: 13.01.2020

Approved by:

COURSE DESCRIPTION

Academic year: 2022/2023

University: Comenius University Bratislava

Faculty: Faculty of Mathematics, Physics and Informatics

Course ID:	**Course title:**
FMFI.KAI/2-ERAa-005/19	Special Topic of Interest Module I

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

Number of credits: 5

Recommended semester: 3.

Educational level: II.

Prerequisites:

Course requirements:

Learning outcomes:

Class syllabus:

Recommended literature:

Languages necessary to complete the course:

Notes:

Past grade distribution
Total number of evaluated students: 17

A	B	C	D	E	FX
52,94	29,41	11,76	0,0	0,0	5,88

Lecturers:

Last change:

Approved by:

COURSE DESCRIPTION

Academic year: 2022/2023

University: Comenius University Bratislava

Faculty: Faculty of Mathematics, Physics and Informatics

Course ID:	**Course title:**
FMFI.KAI/2-ERAa-006/19	Special Topic of Interest Module II

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

Number of credits: 10

Recommended semester: 3.

Educational level: II.

Prerequisites:

Course requirements:

Learning outcomes:

Class syllabus:

Recommended literature:

Languages necessary to complete the course:

Notes:

Past grade distribution
Total number of evaluated students: 26

A	B	C	D	E	FX
65,38	19,23	11,54	3,85	0,0	0,0

Lecturers:

Last change:

Approved by:

COURSE DESCRIPTION

Academic year: 2022/2023

University: Comenius University Bratislava

Faculty: Faculty of Mathematics, Physics and Informatics

Course ID:	**Course title:**
FMFI.KAI+KDMFI/2-AINa-111/20	Web Technologies and Methodology

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

Number of credits: 6

Recommended semester: 1.

Educational level: II.

Prerequisites:

Antirequisites: FMFI.KAI+KDMFI/2-AIN-111/15

Course requirements:
Semester: project 60pts, final test 15pts (minimum 50%)
Exam: oral exam 25pts (admittance requirement: 60pts from the semester)
Passing the course: 50pts altogether and 50% from the final test Scale: A 90%, B 80%, C 70%, D 60%, E 50%
Scale of assessment (preliminary/final): 75/25

Learning outcomes:
An overview of web technologies and their applications for various purposes. Principles and methodologies of web applications, web user interfaces, and web content design.

Class syllabus:
- Overview of web technologies and web architecture
- Information architecture, types of websites, web applications, components and interfaces
- Client platforms (mobile, tablet, desktop) and implications for web design and development
- Methodologies of website and web application development (waterfall model, agile methodologies)
- Interaction design methodologies (user research and modelling, iterative prototype-based design, prototype testing)
- Principles and methodologies of web content curation
- Testing, optimization and maintenance of web applications and web content
- Website and web application quality measures

Recommended literature:
Web Style Guide, 4th ed. / P.J. Lynch, S. Horton. Yale University Press, 2016. Available online: http://webstyleguide.com/
Mobile First. L. Wroblewski, A Book Apart, 2011
Selected current online publications

Languages necessary to complete the course:

Notes:

Past grade distribution
Total number of evaluated students: 8

A	B	C	D	E	FX
25,0	0,0	0,0	25,0	37,5	12,5

Lecturers: doc. RNDr. Zuzana Kubincová, PhD., doc. RNDr. Martin Homola, PhD., Mgr. Ján Kľuka, PhD.

Last change: 23.06.2022

Approved by: