SYLLABUS

1. Information about the study program

1.1 Higher education institution	Babeș-Bolyai University
1.2 Faculty	Faculty of Psychology and Educational Sciences
1.3 Department	Department of Psychology
1.4 Field of study	Psychology – Cognitive Sciences
1.5 Study cycle	Bachelor level
1.6 Study program / Qualification	Psychologist

2. Information about the course

2.1 Title of the course	Cognitive Neuroscience						
2.2 Teacher in charge of the lecture	Dr. Korka Betina-Christiana						
2.3 Teacher in charge of the seminar	Dr. Korka Betina-Christiana						
2.4 Study year	1	2.5 Semester	2	2.6. Examination type	E	2.7 Course type	DS

3. Estimated total time (number of hours of teaching activities per semester)

3.1 Number of hours per week	4	out of which: 3.2 lecture	2	3.3 seminar / laboratory	2
3.4 Total number of hours in the curriculum	56	out of which: 3.5 lecture	28	3.6 seminar / laboratory	28
Distribution of the allocated amount of time:					hours
Individual study (textbook, course support, bibliography, and notes)					56
Supplementary documentation at the library using specialized electronic platforms in the field					22
Preparing for seminars / laboratories, homework, papers, portfolios, and essays					20
Tutoring					4
Exams					2
Other activities: research activities					1

3.7 Total number of hours of individual study	98
3.8 Total number of hours per semester	125
3.9 Number of credits (ECTS)	5

4. Prerequisites (if applicable)

4.1 Curriculum	• Introduction to Neuroscience
4.2 Competencies	-

5. Requirements (if applicable)

5.1 For the lecture	• Classroom with at least 180 seats, computer and video projector / Online course conducted through the MS Teams platform.
5.2 For the seminar / laboratory	• Room with at least 50 seats, computer and video projector / Online seminar conducted through the MS Teams platform.

6. Specific skills acquired

Professional skills	**Knowledge and understanding** • Understanding the place and role of cognitive neuroscience within the study of human behaviour • Knowledge of fundamental aspects and the role of the cognitive neuroscience approach in psychology • Familiarization with the main methods of research in cognitive neuroscience • Understanding the cognitive neuroscience perspective on various behaviours and phenomena **Explanation and interpretation** • Arguing the importance of the cognitive neuroscience in psychology • Interpretation from a cognitive-neuroscientific perspective of different complex phenomena and processes (e.g., attention, emotion, memory) • Carrying out comparative analyses based on the different methods in cognitive neuroscience **Instrumental - applicative** • Learning the main concepts and principles that are necessary to understand the complex neurocognitive functions and phenomena • Developing scientific communication skills as well as skills that are necessary to conduct a research project • Developing critical thinking skills in the context of scientific output evaluation **Attitude** • Manifestation of a positive and responsible attitude towards the (neuro)scientific field • Cultivating a responsible attitude towards the research activity in the field

	• Interest in personal development in the field
Transversal skills	• Written and oral communication skills • Relationship and teamwork skills • Time management skills and the management of resources • Competences in using scientific terminology in the field of cognitive neuroscience • Competences for the interdisciplinary use of knowledge and terminology in the fields of cognitive neuroscience and psychology

7. Objectives of the course (based on the grid of acquired competencies)

7.1 General objective	• Familiarizing students with the approach specific to cognitive neuroscience within the study of psychology
7.2 Specific objectives	• Presentation of cognitive neuroscience as an impactful field in psychology • Analysis of the place and role of cognitive neuroscience in human behaviour • Discussion of the different methods in cognitive neuroscience • Neuroscientific approach to the complex phenomena and processes (e.g., attention, emotion, memory)

8. Content

8.1 Lecture	Teaching strategies	Remarks
An introduction to Cognitive Neuroscience. **Keywords**: mind-body interaction, cognitive sciences	Lecture, demonstrative example, synthesis of knowledge, guided discovery	
Methods in Cognitive Neuroscience. **Keywords:** invasive vs. non-invasive, recording vs. stimulation, temporal resolution, spatial resolution.	Lecture, demonstrative example, synthesis of knowledge, guided discovery	
Human lesion studies.	Lecture, demonstrative example, synthesis of knowledge, guided discovery	
Transcranial magnetic stimulation (TMS).	Lecture, demonstrative example, synthesis of knowledge, guided discovery	
Electrophysiology. **Keywords:** Electroencephalography (EEG),	Lecture, demonstrative example, synthesis of knowledge, guided discovery	

event-related potentials (ERPs)		
Structural and functional neuroimaging. **Keywords:** functional magnetic resonance imaging (fMRI), diffusion tensor imaging (DTI), positron emission tomography (PET).	Lecture, demonstrative example, synthesis of knowledge, guided discovery	
Emotions. **Keywords:** Papez circuit, amygdala, emotional regulation, skin conductance response (SCR).	Lecture, demonstrative example, synthesis of knowledge, guided discovery	
Social cognition. **Keywords:** simulation theory, mirror neurons, theory of mind, autism, antisocial behaviour.	Lecture, demonstrative example, synthesis of knowledge, guided discovery	
Attention. **Keywords:** attentional blindness, exogenous vs. endogenous orienting, feature-integration theory.	Lecture, demonstrative example, synthesis of knowledge, guided discovery	
Spatial orienting. **Keywords:** spatial maps, place cells, grid cells, spatial neglect.	Lecture, demonstrative example, synthesis of knowledge, guided discovery	
Short-term and working memory.	Lecture, demonstrative example, synthesis of knowledge, guided discovery	
Long-term memory. **Keywords:** memory systems, consolidation, amnesia, remembering, forgetting	Lecture, demonstrative example, synthesis of knowledge, guided discovery	
Language processing. **Keywords:** aphasia, semantic memory, language comprehension, language production.	Lecture, demonstrative example, synthesis of knowledge, guided discovery	
Cognitive mechanisms of reading and	Lecture, demonstrative	

writing.	example, synthesis of knowledge, guided discovery	

Mandatory references:

Ward, J. (2019). *The student's guide to cognitive neuroscience, 4th Edition.* New York, NY: Routledge.

Poeppel, D., Mangun, G. R., & Gazzaniga, M. S. (Eds.). (2020). *The cognitive neurosciences,6th Edition*. Cambridge, MA: MIT Press.

Luck, S. J. (2014). *An introduction to the event-related potential technique.* Cambridge, MA: MIT press.

!!! Note: only the chapters related to the topics taught in the lecture and the seminar are mandatory from the works mentioned above

Optional references:

Adolphs, R. (2015). The unsolved problems of neuroscience. *Trends in Cognitive Sciences, 19*(4), 173-175.

Filippi. (2016). *fMRI techniques and protocols (Second Edition).* Humana press.

Gross, J. J. (2013). Emotion regulation: taking stock and moving forward. *Emotion, 13*(3), 359.

Hallett, M. (2007). Transcranial magnetic stimulation: a primer. *Neuron, 55*(2), 187-199.

Hartley, T., Lever, C., Burgess, N., & O'Keefe, J. (2014). Space in the brain: how the hippocampal formation supports spatial cognition. *Philosophical Transactions of the Royal Society B: Biological Sciences, 369*(1635), 20120510.

Ullsperger, M., & Debener, S. (2010). *Simultaneous EEG and fMRI: recording, analysis, and application.* Oxford University Press.

Treisman, A. M., & Gelade, G. (1980). A feature-integration theory of attention. *Cognitive Psychology, 12*(1), 97-136.

8.2 Seminar / laboratory	Teaching strategies	Remarks
Introduction and organizational details.	Exposure, conversation	
Single-cell recordings: the Jennifer Aniston Neuron.	Presentation, knowledge synthesis, conceptual clarification, practical activities	
The strange case of Phineas Gage.	Presentation, knowledge synthesis, conceptual	

Keywords: prefrontal cortex, decision making, executive skills.	clarification, group activities, guided discovery, practical activities	
Repetitive transmagnetic stimulation in depression.	Presentation, knowledge synthesis, conceptual clarification, group activities, guided discovery, practical activities	
Event-related potentials as a window into brain predictive processes.	Presentation, knowledge synthesis, conceptual clarification, group activities, guided discovery, practical activities	
Combined EEG-fMRI in the context of motor imagery neurofeedback.	Presentation, knowledge synthesis, conceptual clarification, group activities, guided discovery, practical activities	
Emotions and cognitive control.	Presentation, knowledge synthesis, conceptual clarification, group activities, Guided discovery, practical activities	
Theory of mind and neurocognitive development.	Presentation, knowledge synthesis, conceptual clarification, group activities, guided discovery, conversation	
The relation between attention and brain predictions.	Presentation, knowledge synthesis, conceptual clarification, group activities, guided discovery, conversation	
The man who mistook his wife for a hat and other interesting case studies.	Presentation, knowledge synthesis, conceptual clarification, group activities, guided discovery, conversation	
Sensory memory in auditory processing: the mismatch negativity component.	Presentation, knowledge synthesis, conceptual clarification, group activities, guided discovery, conversation	
Journal Club: Subsequent memory effect captured in a natural outdoor environment.	Presentation, knowledge synthesis, conceptual clarification, group activities, guided discovery, conversation	
Journal Club: Music and language: transfer effects from professional music	Presentation, knowledge synthesis, conceptual clarification, group activities,	

playing to novel word learning.	guided discovery, conversation	
Summary seminar – putting it all together **Keywords:** synthesis, integration, recap	Knowledge synthesis, conceptual clarification, conversation	

Mandatory references:

Ward, J. (2019). *The student's guide to cognitive neuroscience, 4th Edition.* New York, NY: Routledge.

Poeppel, D., Mangun, G. R., & Gazzaniga, M. S. (Eds.). (2020). *The cognitive neurosciences,6th Edition*. Cambridge, MA: MIT Press.

!!! Note: only the chapters related to the topics taught in the lecture and the seminar are mandatory from the works mentioned above

Damasio, H., Grabowski, T., Frank, R., Galaburda, A. M., & Damasio, A. R. (1994). The return of Phineas Gage: clues about the brain from the skull of a famous patient. *Science, 264*(5162), 1102-1105.

Downar, J., & Daskalakis, Z. J. (2013). New targets for rTMS in depression: A review of convergent evidence. *Brain Stimulation, 6*(3), 231-240.

Dittinger, E., Barbaroux, M., d'Imperio, M., Jäncke, L., Elmer, S., & Besson, M. (2016). Professional music training and novel word learning: From faster semantic encoding to longer-lasting word representations. *Journal of Cognitive Neuroscience, 28*(10), 1584-1602.

Schröger, E., Marzecová, A., & SanMiguel, I. (2015). Attention and prediction in human audition: a lesson from cognitive psychophysiology. *European Journal of Neuroscience, 41*(5), 641-664.

Piñeyro Salvidegoitia, M., Jacobsen, N., Bauer, A. K. R., Griffiths, B., Hanslmayr, S., & Debener, S. (2019). Out and about: Subsequent memory effect captured in a natural outdoor environment with smartphone EEG. *Psychophysiology, 56*(5), e13331.

Quiroga, R. Q., Reddy, L., Kreiman, G., Koch, C., & Fried, I. (2005). Invariant visual representation by single neurons in the human brain. *Nature, 435*(7045), 1102-1107.

Zich, C., Debener, S., Kranczioch, C., Bleichner, M. G., Gutberlet, I., & De Vos, M. (2015). Real-time EEG feedback during simultaneous EEG–fMRI identifies the cortical signature of motor imagery. *NeuroiImage, 114*, 438-447.

Optional references:

Dittinger, E., Korka, B., & Besson, M. (2021). Evidence for Enhanced Long-term Memory in Professional Musicians and Its Contribution to Novel Word Learning. *Journal of Cognitive Neuroscience, 33*(4), 662-682.

Korka, B., Widmann, A., Waszak, F., Darriba, Á., & Schröger, E. (2021). The auditory brain in action: Intention determines predictive processing in the auditory system—A review of current paradigms and findings. *Psychonomic Bulletin & Review*, 1-22.

Näätänen, R., Paavilainen, P., Rinne, T., & Alho, K. (2007). The mismatch negativity (MMN) in basic research of central auditory processing: A review. *Clinical Neurophysiology, 118*(12), 2544-2590.

Sacks, O (2015). *The man who mistook his wife for a hat*. London, UK: Pan Macmillan.

9. Correlations between the content of the course and the expectations of the representatives of the epistemic community, professional associations and representative employers in the field related to the program

The proposed lecture and seminar offer central topics in fundamental and applied research in the field of cognitive neuroscience, while the delivered content is based on the most relevant and recent results found in the literature. The course also offers state of the art research skills that are transferable to any scientific or applied field of research.

10. Evaluation

Activity type	10.1 Evaluation criteria	10.2 Evaluation methods	10.3 Weight in the final grade
10.4 Lecture		Written exam	60%
10.5 Seminar / laboratory		Research project	30%
10.6 Minimum passing score			
The final evaluation will be based on a written exam conducted in the exam session at the end of the second semester and of a research project. The final grade consists of: a. score obtained in the written exam in proportion of 60% (maximum 6 points) b. research project 30% (up 3 points). The simultaneous conditions for passing the Neuroscience exam are: a. a minimum of 2.5 points for the written exam out of the 6 maximum possible points b. a minimum of 5 points from the final grade (combined score: project and exam)			

Date

22. 11. 2021

Signature of the teacher in charge of the lecture and seminar

Approval date in the department

Signature of the Head of the department /director