

SYLLABUS

1. Information about the study program

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| 1.1 Higher education institution | Babeş-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

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|--------------------------------------|------------------------------|--------------|---|-----------------------|---|-----------------|----|
| 2.1 Title of the course | Introduction to Neuroscience | | | | | | |
| 2.2 Teacher in charge of the lecture | Dr. Lavinia Uscătescu | | | | | | |
| 2.3 Teacher in charge of the seminar | Dr. Ana-Maria Ichim | | | | | | |
| 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 | | | | |

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| 3.9 Number of credits (ECTS) | 5 |
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4. Prerequisites (if applicable)

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| 4.1 Curriculum | <ul style="list-style-type: none"> • Introduction to Neuroscience |
| 4.2 Competencies | - |

5. Requirements (if applicable)

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| 5.1 For the lecture | <ul style="list-style-type: none"> • Classroom with at least 180 seats, computer and video projector / Online course conducted through the MS Teams platform. |
| 5.2 For the seminar / laboratory | <ul style="list-style-type: none"> • Room with at least 50 seats, computer and video projector / Online seminar conducted through the MS Teams platform. |

6. Specific skills acquired

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| Professional skills | <p>Knowledge and understanding</p> <ul style="list-style-type: none"> • 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 <p>Explanation and interpretation</p> <ul style="list-style-type: none"> • 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 <p>Instrumental - applicative</p> <ul style="list-style-type: none"> • 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 <p>Attitude</p> <ul style="list-style-type: none"> • Manifestation of a positive and responsible attitude towards the (neuro)scientific field |
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|---------------------------|--|
| | <ul style="list-style-type: none"> • Cultivating a responsible attitude towards the research activity in the field • Interest in personal development in the field |
| Transversal skills | <ul style="list-style-type: none"> • 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)

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|----------------------------|--|
| 7.1 General objective | <ul style="list-style-type: none"> • Familiarizing students with the approach specific to cognitive neuroscience within the study of psychology |
| 7.2 Specific objectives | <ul style="list-style-type: none"> • 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. | Lecture, demonstrative example, synthesis of knowledge, guided discovery | |

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

| | | |
|--|---|---------|
| Cognitive mechanisms of reading and writing. | Lecture, demonstrative example, synthesis of knowledge, guided discovery | |
| <p>Mandatory references:</p> <p>Ward, J. (2019). <i>The student's guide to cognitive neuroscience, 4th Edition</i>. New York, NY: Routledge.</p> <p>Poeppel, D., Mangun, G. R., & Gazzaniga, M. S. (Eds.). (2020). <i>The cognitive neurosciences, 6th Edition</i>. Cambridge, MA: MIT Press.</p> <p>Luck, S. J. (2014). <i>An introduction to the event-related potential technique</i>. Cambridge, MA: MIT press.</p> <p>!!! Note: only the chapters related to the topics taught in the lecture and the seminar are mandatory from the works mentioned above</p> <p>Optional references:</p> <p>Adolphs, R. (2015). The unsolved problems of neuroscience. <i>Trends in Cognitive Sciences</i>, 19(4), 173-175.</p> <p>Filippi. (2016). <i>fMRI techniques and protocols (Second Edition)</i>. Humana press.</p> <p>Gross, J. J. (2013). Emotion regulation: taking stock and moving forward. <i>Emotion</i>, 13(3), 359.</p> <p>Hallett, M. (2007). Transcranial magnetic stimulation: a primer. <i>Neuron</i>, 55(2), 187-199.</p> <p>Hartley, T., Lever, C., Burgess, N., & O'Keefe, J. (2014). Space in the brain: how the hippocampal formation supports spatial cognition. <i>Philosophical Transactions of the Royal Society B: Biological Sciences</i>, 369(1635), 20120510.</p> <p>Ullsperger, M., & Debener, S. (2010). <i>Simultaneous EEG and fMRI: recording, analysis, and application</i>. Oxford University Press.</p> <p>Treisman, A. M., & Gelade, G. (1980). A feature-integration theory of attention. <i>Cognitive Psychology</i>, 12(1), 97-136.</p> | | |
| 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 | |

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| The strange case of Phineas Gage. Keywords: prefrontal cortex, decision making, executive skills. | Presentation, knowledge synthesis, conceptual 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 | |

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| <p>Journal Club: Music and language: transfer effects from professional music playing to novel word learning.</p> | <p>Presentation, knowledge synthesis, conceptual clarification, group activities, guided discovery, conversation</p> | |
| <p>Summary seminar – putting it all together Keywords: synthesis, integration, recap</p> | <p>Knowledge synthesis, conceptual clarification, conversation</p> | |
| <p>Mandatory references:</p> <p>Ward, J. (2019). <i>The student’s guide to cognitive neuroscience, 4th Edition</i>. New York, NY: Routledge.</p> <p>Poeppel, D., Mangun, G. R., & Gazzaniga, M. S. (Eds.). (2020). <i>The cognitive neurosciences, 6th Edition</i>. Cambridge, MA: MIT Press.</p> <p>!!! Note: only the chapters related to the topics taught in the lecture and the seminar are mandatory from the works mentioned above</p> <p>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. <i>Science</i>, 264(5162), 1102-1105.</p> <p>Downar, J., & Daskalakis, Z. J. (2013). New targets for rTMS in depression: A review of convergent evidence. <i>Brain Stimulation</i>, 6(3), 231-240.</p> <p>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. <i>Journal of Cognitive Neuroscience</i>, 28(10), 1584-1602.</p> <p>Schröger, E., Marzecová, A., & SanMiguel, I. (2015). Attention and prediction in human audition: a lesson from cognitive psychophysiology. <i>European Journal of Neuroscience</i>, 41(5), 641-664.</p> <p>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. <i>Psychophysiology</i>, 56(5), e13331.</p> <p>Quiroga, R. Q., Reddy, L., Kreiman, G., Koch, C., & Fried, I. (2005). Invariant visual representation by single neurons in the human brain. <i>Nature</i>, 435(7045), 1102-1107.</p> <p>Zich, C., Debener, S., Kranczoch, 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. <i>NeuroImage</i>, 114, 438-447.</p> | | |

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

29. 09. 2023

Signature of the teacher in charge of the lecture and seminar

Approval date in the department

Signature of the Head of the department /director

2nd Semester, 2023-2024

Cognitive Neuroscience

Dr. Lavinia Carmen Uscătescu

Week 1: February 26th

An introduction to Cognitive Neuroscience and methods

Keywords: mind-body interaction, cognitive sciences, invasive vs. non-invasive, recording vs. stimulation, temporal resolution, spatial resolution

Required reading:

Purves, D., ..., & Woldorff, M.G. (2012). Principles of Cognitive Neuroscience. → Chapter 2. The Methods of Cognitive Neuroscience.

Ward, J. (2020). The student's guide to Cognitive Neuroscience. → Chapter 1. Introducing cognitive neuroscience.

Optional reading:

Purves, D., ..., & Woldorff, M.G. (2012). Principles of Cognitive Neuroscience. → Chapter 1. Cognitive Neuroscience: Definitions, Themes, and Approaches.

Week 2: March 4th

Human lesion studies and brain stimulation methods

Keywords: brain lesions, transcranial magnetic stimulation (TMS), transcranial electrical stimulation (tES), Deep Brain Stimulation (DBS)

Required reading:

Ward, J. (2020). The student's guide to Cognitive Neuroscience. → Chapter 5. The lesioned brain and stimulated brain (pp. 87–101).

Optional reading:

Adolphs, R. (2016). Human Lesion Studies in the 21st Century. *Neuron*, 90(6), 1151–1153.

Joutsa, J., Lipsman, N., Horn, A., Cosgrove, G. R., & Fox, M. D. (2023). The return of the lesion for localization and therapy. *Brain*, 146(8), 3146–3155.

Kolb, B. (2022). Brenda Milner: Pioneer of the Study of the Human Frontal Lobes. *Frontiers in Human Neuroscience*, 15.

Squire, L. R. (2009). The Legacy of Patient H.M. for Neuroscience. *Neuron*, 61(1), 6–9.

Week 3: March 11th

Electrophysiology

Keywords: electroencephalography (EEG), brain-computer interface (BCI), electrooculogram (EOG), magnetoencephalography (MEG), event-related potential (ERP)

Required reading:

Ward, J. (2020). The student's guide to Cognitive Neuroscience. → Chapter 3. The electrophysiological brain.

Optional reading:

McFarland, D. J., & Wolpaw, J. R. (2017). EEG-based brain-computer interfaces. *Current Opinion in Biomedical Engineering*, 4, 194–200.

Week 4: March 18th

Structural and functional neuroimaging

Keywords: Magnetic Resonance Imaging (MRI), Blood Oxygen Level-Dependent (BOLD) signal, preprocessing, signal-to-noise-ratio (SNR), artifact, timeseries, contrast

Required reading:

Westbrook, C. & Talbot, J. (2018). *MRI in Practice* → Chapter 1. Basic principles.

Optional reading:

Westbrook, C. & Talbot, J. (2018). *MRI in Practice* → Chapter 2. Image weighting and contrast.

Westbrook, C. & Talbot, J. (2018). *MRI in Practice* → Chapter 8. Artifacts.

Week 5: March 25th

Eye-tacking and pupillometry

Keywords: fovea, saccade, fixation, smooth pursuit, pupil dilation, calibration

Required reading:

Graham, L., ... & Stuart, S. (2022). The Eyes as a Window to the Brain and Mind. In Stuart, S. (Editor), *Eye Tracking Background, Methods, and Applications* (pp. 1–14). Humana Press.

Optional reading:

Carter, B. T., & Luke, S. G. (2020). Best practices in eye tracking research. *International Journal of Psychophysiology*, 155, 49–62.

Graham, L., ... & Stuart, S. (2022). A Brief History of Eye Movement Research. In Stuart, S. (Editor), *Eye Tracking Background, Methods, and Applications* (pp. 15–29). Humana Press.

Week 6: April 1st

Peripheral psychophysiological measures

Keywords: skin conductance response, heart rate variability, electromyography, vagal tone

Required reading:

Levinson, A., & Hajcak, G. (2020). Peripheral Psychophysiology. *The Cambridge Handbook of Research Methods in Clinical Psychology*, 118–135.

Optional reading:

Tassinari, L. G., Hess, U., & Carcoba, L. M. (2012). Peripheral physiological measures of psychological constructs. In H. Cooper, P. M. Camic, D. L. Long, A. T. Panter, D. Rindskopf, & K. J. Sher (Eds.), *APA handbook of research methods in psychology, Vol. 1. Foundations, planning, measures, and psychometrics* (pp. 461–488). American Psychological Association.

Week 7: April 8th

Memory

Keywords: memory systems, short-term memory, episodic memory, long-term memory, consolidation, amnesia, remembering, forgetting

Required reading:

Ward, J. (2020). The student's guide to Cognitive Neuroscience. → Chapter 11. The remembering brain.

Optional reading:

Clayton, N. S., & Wilkins, C. (2018). Seven myths of memory. *Behavioural Processes*, 152, 3–9.

Week 8: April 15th

Language processing

Keywords: aphasia, semantic memory, language comprehension, language production, transfer abilities

Required reading:

Ward, J. (2020). The student's guide to Cognitive Neuroscience. → Chapter 12. The speaking brain.

Optional reading:

Fedorenko, E., Hsieh, P.-J., Nieto-Castañón, A., Whitfield-Gabrieli, S., & Kanwisher, N. (2010). New Method for fMRI Investigations of Language: Defining ROIs Functionally in Individual Subjects. *Journal of Neurophysiology*, 104(2), 1177–1194.

Fedorenko, E., & Thompson-Schill, S. L. (2014). Reworking the language network. *Trends in Cognitive Sciences*, 18(3), 120–126.

Week 9: April 22nd

Cognitive mechanisms of reading and writing

Keywords: orthography, lexical decision, phonological awareness, subitizing, dyslexia, dysgraphia, dyscalculia

Required reading:

Ward, J. (2020). The student's guide to Cognitive Neuroscience. → Chapter 13. The literate brain.

Optional reading:

Chakravarthi, R., Nordqvist, A., Poncet, M., & Adamian, N. (2023). Fundamental units of numerosity estimation. *Cognition*, 239, 105565.

Chung, P. J., Patel, D. R., & Nizami, I. (2020). Disorder of written expression and dysgraphia: definition, diagnosis, and management. *Translational Pediatrics*, 9(S1),

Hulme, C., & Snowling, M. J. (2016). Reading disorders and dyslexia. *Current Opinion in Pediatrics*, 28(6), 731–735.

Rapin, I. (2016). Dyscalculia and the Calculating Brain. *Pediatric Neurology*, 61, 11–20.

Week 10: April 29th

Emotions

Keywords: theory of mind, mentalizing, mirroring, emotion perception and regulation, face perception

Required reading:

Bear, M., Connors, B., & Paradiso, M. A. (2016). *Neuroscience: Exploring the Brain*. → Chapter 18. Brain Mechanisms of Emotion.

Ward, J. (2020). *The student's guide to Cognitive Neuroscience*. → Chapter 16. The social and emotional brain.

Optional reading:

Goerlich, K. S. (2018). The Multifaceted Nature of Alexithymia – A Neuroscientific Perspective. *Frontiers in Psychology*, 9.

Hogeveen, J., & Grafman, J. (2021). Alexithymia. *Disorders of Emotion in Neurologic Disease*, 47–62.

--- One week holiday (May 5th to 12th) ---

Week 11: May 13th

Social cognition

Keywords: the social brain, modularity, domain specificity, autism, psychopathy

Required reading:

Ward, J. (2017). The Student's Guide to Social Neuroscience. → Chapter 1. Introduction to social neuroscience.

Optional reading:

Kilford, E.J. & Blakemore, S.-J. (2020). Social cognition and social brain development in adolescence. In Poeppel, D., Mangun, G.R. & Gazzaniga, M.S. (Eds.), The Cognitive Neurosciences (pp. 37–46). The MIT Press.

Ward, J. (2017). The Student's Guide to Social Neuroscience. → Chapter 2. The methods of social neuroscience.

Wheatley, T. & Boncz, A. (2020). Interpersonal Neuroscience. In Poeppel, D., Mangun, G.R. & Gazzaniga, M.S. (Eds.), The Cognitive Neurosciences (pp. 987–995). The MIT Press.

Week 12: May 20th

Attention & spatial orientation

Keywords: salience, covert and overt orienting, exogenous and endogenous orienting, visual search, hemispatial neglect

Required reading:

Ward, J. (2020). The student's guide to Cognitive Neuroscience. → Chapter 9. The attending brain.

Optional reading:

Corbetta, M., & Shulman, G. L. (2002). Control of goal-directed and stimulus-driven attention in the brain. *Nature Reviews Neuroscience*, 3(3), 201–215.

Week 13: May 27th

Executive functions

Keywords: working memory, task-setting, impulse control, task-switching

Required reading:

Ward, J. (2020). The student's guide to Cognitive Neuroscience. → Chapter 15. The executive brain.

Optional reading:

Blair C. (2017). Educating executive function. Wiley interdisciplinary reviews. Cognitive science, 8(1-2), 10.1002/wcs.1403.

Week 14: June 3rd

Computational neuroscience and computational psychiatry

Keywords: precision psychiatry, machine learning, prediction, big data

Required reading: -- slides only

Optional reading:

Fernandes, B. S., Williams, L. M., Steiner, J., Leboyer, M., Carvalho, A. F., & Berk, M. (2017). The new field of 'precision psychiatry.' BMC Medicine, 15(1).

Huys, Q. J. M., Maia, T. V., & Frank, M. J. (2016). Computational psychiatry as a bridge from neuroscience to clinical applications. Nature Neuroscience, 19(3), 404–413.

Kriegeskorte, N., & Douglas, P. K. (2018). Cognitive computational neuroscience. Nature Neuroscience, 21(9), 1148–1160.

2nd Semester, 2023-2024

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Dr. Lavinia Carmen Uscătescu

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Keywords: brain lesions, transcranial magnetic stimulation (TMS), transcranial electrical stimulation (tES), Deep Brain Stimulation (DBS)

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Squire, L. R. (2009). The Legacy of Patient H.M. for Neuroscience. *Neuron*, 61(1), 6–9.

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Optional reading:

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Optional reading:

Tassinari, L. G., Hess, U., & Carcoba, L. M. (2012). Peripheral physiological measures of psychological constructs. In H. Cooper, P. M. Camic, D. L. Long, A. T. Panter, D. Rindskopf, & K. J. Sher (Eds.), *APA handbook of research methods in psychology, Vol. 1. Foundations, planning, measures, and psychometrics* (pp. 461–488). American Psychological Association.

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Ward, J. (2020). The student's guide to Cognitive Neuroscience. → Chapter 11. The remembering brain.

Optional reading:

Clayton, N. S., & Wilkins, C. (2018). Seven myths of memory. *Behavioural Processes*, 152, 3–9.

Week 8: April 15th

Language processing

Keywords: aphasia, semantic memory, language comprehension, language production, transfer abilities

Required reading:

Ward, J. (2020). The student's guide to Cognitive Neuroscience. → Chapter 12. The speaking brain.

Optional reading:

Fedorenko, E., Hsieh, P.-J., Nieto-Castañón, A., Whitfield-Gabrieli, S., & Kanwisher, N. (2010). New Method for fMRI Investigations of Language: Defining ROIs Functionally in Individual Subjects. *Journal of Neurophysiology*, 104(2), 1177–1194.

Fedorenko, E., & Thompson-Schill, S. L. (2014). Reworking the language network. *Trends in Cognitive Sciences*, 18(3), 120–126.

Week 9: April 22nd

Cognitive mechanisms of reading and writing

Keywords: orthography, lexical decision, phonological awareness, subitizing, dyslexia, dysgraphia, dyscalculia

Required reading:

Ward, J. (2020). The student's guide to Cognitive Neuroscience. → Chapter 13. The literate brain.

Optional reading:

Chakravarthi, R., Nordqvist, A., Poncet, M., & Adamian, N. (2023). Fundamental units of numerosity estimation. *Cognition*, 239, 105565.

Chung, P. J., Patel, D. R., & Nizami, I. (2020). Disorder of written expression and dysgraphia: definition, diagnosis, and management. *Translational Pediatrics*, 9(S1),

Hulme, C., & Snowling, M. J. (2016). Reading disorders and dyslexia. *Current Opinion in Pediatrics*, 28(6), 731–735.

Rapin, I. (2016). Dyscalculia and the Calculating Brain. *Pediatric Neurology*, 61, 11–20.

Week 10: April 29th

Emotions

Keywords: theory of mind, mentalizing, mirroring, emotion perception and regulation, face perception

Required reading:

Bear, M., Connors, B., & Paradiso, M. A. (2016). *Neuroscience: Exploring the Brain*. → Chapter 18. Brain Mechanisms of Emotion.

Ward, J. (2020). *The student's guide to Cognitive Neuroscience*. → Chapter 16. The social and emotional brain.

Optional reading:

Goerlich, K. S. (2018). The Multifaceted Nature of Alexithymia – A Neuroscientific Perspective. *Frontiers in Psychology*, 9.

Hogeveen, J., & Grafman, J. (2021). Alexithymia. *Disorders of Emotion in Neurologic Disease*, 47–62.

--- One week holiday (May 5th to 12th) ---

Week 11: May 13th

Social cognition

Keywords: the social brain, modularity, domain specificity, autism, psychopathy

Required reading:

Ward, J. (2017). The Student's Guide to Social Neuroscience. → Chapter 1. Introduction to social neuroscience.

Optional reading:

Kilford, E.J. & Blakemore, S.-J. (2020). Social cognition and social brain development in adolescence. In Poeppel, D., Mangun, G.R. & Gazzaniga, M.S. (Eds.), The Cognitive Neurosciences (pp. 37–46). The MIT Press.

Ward, J. (2017). The Student's Guide to Social Neuroscience. → Chapter 2. The methods of social neuroscience.

Wheatley, T. & Boncz, A. (2020). Interpersonal Neuroscience. In Poeppel, D., Mangun, G.R. & Gazzaniga, M.S. (Eds.), The Cognitive Neurosciences (pp. 987–995). The MIT Press.

Week 12: May 20th

Attention & spatial orientation

Keywords: salience, covert and overt orienting, exogenous and endogenous orienting, visual search, hemispatial neglect

Required reading:

Ward, J. (2020). The student's guide to Cognitive Neuroscience. → Chapter 9. The attending brain.

Optional reading:

Corbetta, M., & Shulman, G. L. (2002). Control of goal-directed and stimulus-driven attention in the brain. *Nature Reviews Neuroscience*, 3(3), 201–215.

Week 13: May 27th

Executive functions

Keywords: working memory, task-setting, impulse control, task-switching

Required reading:

Ward, J. (2020). The student's guide to Cognitive Neuroscience. → Chapter 15. The executive brain.

Optional reading:

Blair C. (2017). Educating executive function. Wiley interdisciplinary reviews. Cognitive science, 8(1-2), 10.1002/wcs.1403.

Week 14: June 3rd

Computational neuroscience and computational psychiatry

Keywords: precision psychiatry, machine learning, prediction, big data

Required reading: -- slides only

Optional reading:

Fernandes, B. S., Williams, L. M., Steiner, J., Leboyer, M., Carvalho, A. F., & Berk, M. (2017). The new field of 'precision psychiatry.' BMC Medicine, 15(1).

Huys, Q. J. M., Maia, T. V., & Frank, M. J. (2016). Computational psychiatry as a bridge from neuroscience to clinical applications. Nature Neuroscience, 19(3), 404–413.

Kriegeskorte, N., & Douglas, P. K. (2018). Cognitive computational neuroscience. Nature Neuroscience, 21(9), 1148–1160.