UNIVERSITY OF WARSAW

UNIVERSITY'S INTEGRATED DEVELOPMENT PROGRAMME

Course syllabus

Course title	Methods in neuroscience
Instructor(s)	prof. Łukasz Okruszek
Contact details	Lukasz.okruszek@psych.uw.edu.pl
Affiliation	Social Neuroscience Lab, Institute of Psychology, PAS Faculty of Psycholog, University of Warsaw
Course format	lecture
Number of hours	30 hours
Number of ECTS credits	**3 ECTS credits** 90 h = 30 h = lecture attendance 30 h = reading weekly assigments 30 h = exam preparation
Brief course description	The aim of the lecture is to introduce students to the wide range of methods which are used in cognitive neuroscience to study brain – behavior relationship. Furthermore, specific applications as well as strengths and limitations of each method will be discussed.
Full course description	Cognitive neuroscience is an interdisciplinary field, which aims to investigate neural underpinnings of brain-behavior relationship. To achieve this goal, a wide arrange of methods, ranging from traditional lesion studies to multimodal neuroimaging methods. During the course students will be introduced to the methods used in the cognitive neurosicence research, including behavioral and psychophysics paradigms, neuropsychological lesion studies, psychophysiogical and neurophysiological methods, noninvasive brain stimulation methods, and neuroimaging methods. Both theoretical foundations and practical issues linked to the use of each of the method will be discussed. Furthermore, strengths and shortcomings of each method will be presented to enable students to make informed methodological desciosn while planning their own experiments.
Learning outcomes	Course should enable students to: - understand the mechanisms and applications of the most commonly used methods in cognitive neurosicence (K_W01; K_W02; K_W05; K_W06; K_W07; K_W07) - knows the strenghts and limitations of each method (K_U01; K_K06; K_K02) - be able to critically evaluate methodology of cognitive neuroscience research (K_U01; K_U07; K_K06; K_K01; K_K02)

	- be able to choose adequate method to be applied in their future research work (K_U02; K_U10)
Learning activities and teaching methods	The lecture will be interspersed with group discussions. All of the students will be invited to contribute to the group discussion, which will be based on the assigned readings.
List of topics/classes and bibliography	1 Introduction 2. Behavioral paradigms Kliemann, D., & Adolphs, R. (2018). The social neuroscience of mentalizing: Challenges and recommendations. *Current opinion in psychology*, *24*, 1-6. (T) Okruszek, Ł., Piejka, A., Wysokiński, A., Szczepocka, E., & Manera, V. (2018). Biological motion sensitivity, but not interpersonal predictive coding is impaired in schizophrenia. (E) 3. Neuropsychological assessment & lesions Beadle, J. N., & Tranel, D. (2015). Social Neuroscience: Neuropsychological Perspective. *The Oxford Handbook of Social Neuroscience*, 49. (ch 5) (T) Okruszek, Ł., & Rutkowska, A. (2013). Planning disorders in men with schizophrenia and in men with localized frontal lobe lesions. *Psychiatria polska*, *47*, 921-931. (E) 4. Meta-analysis Kern, R. S., Penn, D. L., Lee, J., Horan, W. P., Reise, S. P., Ochsner, K. N., ... & Green, M. F. (2013). Adapting social neuroscience measures for schizophrenia clinical trials, Part 2: trolling the depths of psychometric properties. *Schizophrenia bulletin*, *39*(6), 1201-1210. (E) Okruszek, Ł., & Pilecka, I. (2017). Biological motion processing in schizophrenia–Systematic review and meta-analysis. *Schizophrenia research*, *190*, 3-10. (E) 5-6. Psychophysiology & digital phenotyping Shaffer, F., McCraty, R., & Zerr, C. L. (2014). A healthy heart is not a metronome: an integrative review of the heart's anatomy and heart rate variability. *Frontiers in psychology*, *5*, 1040. (T) Torous, J., Onnela, J. P., & Keshavan, M. (2017). New dimensions and new tools to realize the potential of RDoC: digital phenotyping via smartphones and connected devices. *Translational psychiatry*, *7*(3), e1053. (T)

Okruszek, Ł., Dolan, K., Lawrence, M., & Cella, M. (2017). The beat of social cognition: Exploring the role of heart rate variability as marker of mentalizing abilities. *Social neuroscience*, *12*(5), 489-493. (E)

7-8. EEG and ERPs

Ibanez, A., Melloni, M., Huepe, D., Helgiu, E., Rivera-Rei, A., Canales-Johnson, A., ... & Moya, A. (2012). What event-related potentials (ERPs) bring to social neuroscience?. *Social neuroscience*, *7*(6), 632-649. (T)

Okruszek, Ł., Jarkiewicz, M., Gola, M., Cella, M., & Łojek, E. (2018). Using ERPs to explore the impact of affective distraction on working memory stages in schizophrenia. *Cognitive, Affective, & Behavioral Neuroscience*, *18*(3), 437-446. (E)

9-10. Noninvasive brain stimulation

Filmer, H. L., Dux, P. E., & Mattingley, J. B. (2014). Applications of transcranial direct current stimulation for understanding brain function. Trends in neurosciences, 37(12), 742-753.

Marini, M., Banaji, M. R., & Pascual-Leone, A. (2018). Studying implicit social cognition with noninvasive brain stimulation. *Trends in cognitive sciences*.

van Kemenade, B. M., Muggleton, N., Walsh, V., & Saygin, A. P. (2012). Effects of TMS over premotor and superior temporal cortices on biological motion perception. *Journal of Cognitive Neuroscience*, *24*(4), 896-904.

11-13 Magnetic Resonance Imaging:

Amaro Jr, E., & Barker, G. J. (2006). Study design in fMRI: basic principles. Brain and cognition, 60(3), 220-232. (T)

Poldrack, R. A. (2012). The future of fMRI in cognitive neuroscience. Neuroimage, 62(2), 1216-1220. (T)

Okruszek, Ł., Wordecha, M., Jarkiewicz, M., Kossowski, B., Lee, J., & Marchewka, A. (2018). Brain correlates of recognition of communicative interactions from biological motion in schizophrenia. Psychological medicine, 48(11), 1862-1871. (E)

14-15. Resting state fMRI:
Schmälzle, R., O'Donnell, M. B., Garcia, J. O., Cascio, C. N., Bayer, J., Bassett, D. S., ... & Falk, E. B. (2017). Brain connectivity dynamics during

	social interaction reflect social network structure. Proceedings of the National Academy of Sciences, 114(20), 5153-5158. (E) Cole, D. M., Smith, S. M., & Beckmann, C. F. (2010). Advances and pitfalls in the analysis and interpretation of resting-state FMRI data. Frontiers in systems neuroscience, 4, 8. (T)
Assessment methods and criteria	Overall grade dependens on the number of points scored during the semester. Points can be scored via: - two quizzes (0-5 points each) - activity during the classes (0-2 points during each class; up to 30 points overall) - exam – (0-60 points; at least 36 points to pass the exam) Grading poilicy: >95 pts – 5! 90-95 – 5 80-89 – 4.5 70-79 – 4 65-69 – 3.5 60-64 - 3
Attendance rules	Max. 2 unexcused absences are allowed, missing more than 4 lectures is equivalent to the course failure
Prerequisites	-
Academic honesty	Students must respect the principles of academic integrity. Cheating and plagiarism (including copying work from other students, internet or other sources) are serious violations that are punishable and instructors are required to report all cases to the administration.
Remarks	-