

Kognitywistyka, studia I stopnia

Oferta seminariów licencjackich 2025/2026

seminarium dyplomowe jest wybierane na III semestry

dr Marcin Rządeczka (Instytut Filozofii)

marcin.rzadeczka@mail.umcs.pl

Computational Psychiatry: Mental Disorders in the Digital Age

Undoubtedly, mental disorders can be counted amongst the most complex objects of scientific inquiry, which is not only a result of their multi-level casual hierarchy, mostly consisting of several to dozens of intrinsic and extrinsic factors, but also some very intricate criteria of diagnosis. It is nearly impossible to apply typological thinking to them, due to the fact that they form wide spectra of manifestations defeating any attempt to classify them as a discrete entity with a well-defined set of constituent symptoms. For the abovementioned reasons, until recently, the science of psychopathology lacked any serious candidate for a unifying theoretical framework able to offer, at least, some draft explanation of the mental disorders' ultimate causes.

Integrating computational modelling into psychiatry can facilitate research in several fundamental and novel ways. What are the fundamental biopsychological components involved in mental disorders and what are the mathematical relationships between these components? How do local dysfunctions of the endocrine or immune system create complex interactions with the nervous system and finally lead to some mental illness? Why natural selection has not eliminated many gene variants responsible for some of the most debilitating mental disorders, such as schizophrenia, autism, bipolar disorder, or depression. These are only preliminary questions that require the computational paradigm due to their sheer complexity and the interdisciplinary nature of the research involved.

Selected topics:

1. Automated expertise in psychiatry
2. VR/ER/MR in diagnosis and treatment of mental disorders
3. Semantic networks as a tool for structuring experience of patients
4. Eye-tracking and eye-hand coordination tests and their role in the diagnosis
5. Specific cognitive bias in mental disorders
6. Chatbots in the realm of mental health
7. Digital phenotyping as an auxiliary tools is the diagnosis of mental disorders
8. Mental disorders as suboptimal algorithms: computational approach to mental health
9. Bioinformatics in mental health: individualized psychiatry
10. Evolutionary models of mental disorders: computational perspective