

<b>title of the subject: Cognitive Informatics in Human Vision</b>	<b>credits: 2+2</b>
type of the subject: lecture and practical course	
appraisal (examination/ practical course mark / other): examination and practical course mark	
place in the curriculum (semester): 3	
prerequisites ( <i>if any</i> ):	
description of the subject:	
<p>The course will cover cognitive and computational aspects of human vision that extends beyond biological vision. It will start with a historical overview of major technological inventions that influenced our understanding of human vision. Each lecture will frame the topic according David Marr's levels of explanations. Then, through a variety of examples the course will step-by-step introduce information theory from Shannon information to the formalism of mutual information and finally the Bayesian model. In the course we will overview the major pathways of visual information processing, discuss the differences between bottom-up, top-down and reverse hierarchy models. Special focus will be given to different perceptual biases, signal detection, choice-probability, game theory and decision-making. The second half of the course will cover higher visual functions, object recognition, semantics, spatial cognition, visual imagery, causality perception, active vision and eye movements. These functions will be illustrated through models using neural networks, machine learning algorithms and artificial intelligence examples. Disorders of vision will be discussed. Finally, the course will end with an outlook to the future by discussing brain-machine interfaces and neural enhancements along with their potential clinical and everyday applications.</p>	
required readings:	
<p>Selected literature:  Hoffman, D. D. (1998). <i>Visual intelligence: how we create what we see</i> (1st ed.). New York: W.W. Norton.  Marr, D. C. (1982). <i>Vision: A Computational Investigation into the Human Representation and Processing of Visual Information</i>. New York: Freeman.  Zeki, S. (1993). <i>A vision of the brain</i>. Oxford ; Boston: Blackwell Scientific Publications.  Rieke, F., Warland, D., van Steveninck, R. R., &amp; Bialek, W. (1997). <i>Exploring the Neural Code (Computational Neuroscience)</i>. Cambridge MA: Bradford Book - MIT Press.</p>	
<b>Person in charge of the subject</b> ( <i>name, position, scientific degree</i> ): <b>Zoltán Nádasdy, senior research fellow, PhD</b>	
<b>Teacher(s) of the subject</b> if any ( <i>name, position, scientific degree</i> ) : <b>Zoltán Nádasdy, senior research fellow, PhD</b>	