

## **Syllabus for the course «Introduction to Cognitive Science»**

(4 ECTS)

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### **1. Course Description**

**a.** «Introduction to Cognitive Science»

**b. Pre-requisites**

None

**c. Elective**

**d. Abstract**

Cognitive science is the interdisciplinary research field, traditionally including psychology, neuroscience, linguistics, computer science, philosophy and anthropology. In this course, we will discuss the origin of cognitive science, its history, main issues, methods and problems. What is the relation between different fields of cognitive science such as psychology and neuroscience? Why cognitive science needs philosophy? What is consciousness? How is brain related to cognition? We will study the main approaches to those questions in this course. Finally, we will discuss the contemporary state and prospects of cognitive science, as well as applications of cognitive science in real life and technology.

### **2. Learning Objectives**

The main goal of this course is to introduce students into basic concepts of cognitive science, the basic methods of cognitive science and the main researches in the field of cognitive science.

### **3. Learning Outcomes**

After completing the study of the discipline «Introduction to Cognitive Science» the student should:

- Know the subject and main concepts of cognitive science, its fields, connections with other disciplines, and how it bridges knowledge from multiple perspectives;
- Know basic contribution of disciplines such as philosophy, psychology, neuroscience and artificial intelligence to cognitive science;
- Know the basic methods and researches in the field of cognitive science;
- Know the essence of the main methodological problems of cognitive science;

- Be able to choose an adequate method of cognitive science, in accordance with the research task;
- Be able to critically and orally present on content from various approaches and interpret with respect to cognitive science;
- Be able to choose an adequate method of cognitive science, in accordance with the research task.

#### 4. Course Plan

№	Topic
1.	The basic concepts of cognitive science
2.	History of cognitive science
3.	Approaches in cognitive science: symbolic, modular, connectionism
4.	Interdisciplinary research methods in cognitive science: eye tracking and brain study methods
5.	Methodological problems of cognitive science: the problem of consciousness and the problem of the substrate of cognitive processes
6.	Interdisciplinary studies of perception and attention
7.	Interdisciplinary studies of learning and memory
8.	Interdisciplinary studies of thinking and speech
9.	Applied cognitive science
10.	Development and prospects of cognitive science

#### 5. Reading List

##### a. Required

Thagard, P. (2009). Why cognitive science needs philosophy and vice versa. *Topics in Cognitive Science*, 1, 237-254. Режим доступа: <https://onlinelibrary.wiley.com/doi/full/10.1111/j.1756-8765.2009.01016.x>

Knoblich G., Ohlsson S., & Raney G. (2001). An eye movement study of insight problem solving. *Memory & Cognition*, 29(7), 1000–1009. Режим доступа: <https://link.springer.com/article/10.3758/BF03195762>

Amaro, E., & Barker, G.J. (2006). Study design in fMRI: Basic principles. *Brain and cognition*, 60( 3), 220-232. Режим доступа: <https://www.sciencedirect.com/science/article/pii/S0278262605001752?via%3Dihub>

- Robertson, E.M., Théoret, H., & Pascual-Leone, A. (2003). Studies in cognition: the problems solved and created by transcranial magnetic stimulation. *Journal of Cognitive Neuroscience*, 15(7), 948-960. Режим доступа: <https://www.mitpressjournals.org/doi/abs/10.1162/089892903770007344>
- O'Craven, K., Downing, P., & Kanwisher, N. (2000). fMRI Evidence for Objects as the Units of Attentional Selection. *Nature*, 401, 584-587. Режим доступа: <https://www.nature.com/articles/44134>
- Wojciulik, E., & Kanwisher, N. (1999). The Generality of Parietal Involvement in Visual Attention. *Neuron*, 23(4), 747-764. Режим доступа: <https://www.sciencedirect.com/science/article/pii/S0896627301800337?via%3Dihub>
- Adamo, S.H., Cain, M.S., & Mitroff, S.R. (2013). Self-induced attentional blink: a cause of errors in multiple-target search. *Psychological Science*, 24(12), 2569-2574. Режим доступа: [https://journals.sagepub.com/doi/full/10.1177/0956797613497970?url\\_ver=Z39.88-2003&rfr\\_id=ori%3Arid%3Acrossref.org&rfr\\_dat=cr\\_pub%3Dpubmed](https://journals.sagepub.com/doi/full/10.1177/0956797613497970?url_ver=Z39.88-2003&rfr_id=ori%3Arid%3Acrossref.org&rfr_dat=cr_pub%3Dpubmed)
- Simons, D.J., & Chabris, C.F. (1999). Gorillas in our midst: sustained inattention blindness for dynamic events. *Perception*, 28(9), 1059-1074. Режим доступа: <https://journals.sagepub.com/doi/abs/10.1068/p281059>
- Cowan, N. (2008). What are the differences between long-term, short-term, and working memory? *Progress in Brain Research*, 169, 323-338. Режим доступа: <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC2657600/>
- Chein, J.M., Weisberg, R.W., Streeter, N.L., & Kwok, S. (2010). Working memory and insight in the nine-dot problem. *Memory & Cognition*, 38(7), 883-892. Режим доступа: <https://link.springer.com/article/10.3758/MC.38.7.883>
- Chaminade, T., Rosset, D., Da Fonseca, D., Nazarian, B., Lutchter, E., Cheng, G., & Deruelle, C. (2012). How do we think machines think? An fMRI study of alleged competition with an artificial intelligence. *Frontiers in Human Neuroscience*, 6, 103. Режим доступа: <https://www.frontiersin.org/articles/10.3389/fnhum.2012.00103/full>
- Wiese, E., Wykowska, A., Zwickel, J., & Müller, H. J. (2012). I See What You Mean: How Attentional Selection Is Shaped by Ascribing Intentions to Others. *PLoS ONE*, 7(9). Режим доступа: <https://journals.plos.org/plosone/article?id=10.1371/journal.pone.0045391>
- Norman D. *The Design of Everyday Things, Revised and Expanded Edition*. Basic Books. 2013. Режим доступа: <https://library.books24x7.com/toc.aspx?bookid=59487>
- McClure, S.M., Li, J., Tomlin, D., Cypert, K.S., Montague, L.M., & Montague, P.R. (2004). Neural correlates of behavioral preference for culturally familiar drinks. *Neuron*, 44 (2), 379-387. Режим доступа: <https://www.sciencedirect.com/science/article/pii/S0896627304006129>

## b. Optional

Calvo, P., & Gomila, T. (Eds.). (2008). Handbook of cognitive science: An embodied approach. Elsevier. — Режим доступа: <https://www.sciencedirect.com/book/9780080466163/handbook-of-cognitive-science>

## 6. Grading System

The rate formula is as follows:

$$O = 0,2 \times O_{\text{activity}} + 0,2 \times O_{\text{test1}} + 0,2 \times O_{\text{test2}} + 0,4 \times O_{\text{exam}}$$

The final grade, which is the resultant grade for the course, goes to the certificate of Master's degree.

## 7. Guidelines for Knowledge Assessment

**Activity** assumes attendance on seminar classes and participation in discussions on seminar classes. The formula for the activity rate is as follows:

$$O_{\text{activity}} = 0,2 \times O_{\text{attendance}} + 0,8 \times O_{\text{discussions}}$$

The student has the ability to compensate the classes missed due to sickness (or other serious issue) if it is confirmed by the official document. The student may also compensate the missed classes without the official document twice for the whole course.

**Test1** is the multiple choice test on topics 4 and 5.

**Test2** is the multiple choice test on topics 6, 7 and 8.

Exam is the multiple choice test on topics 1-10.

**Table of Grade Accordance**

<b>Ten-point Grading Scale</b>	<b>Five-point Grading Scale</b>	
1 - very bad 2 - bad 3 - no pass	no pass - 2	<b>FAIL</b>
4 - pass 5 - highly pass	pass - 3	<b>PASS</b>
6 - good 7 - very good	good - 4	
8 - almost excellent 9 - excellent 10 - perfect	excellent - 5	

## **8. Methods of Instruction**

The following educational technologies are used in the study process:

- Lectures involving continuous use of multimedia presentations and on-line simulations
- Seminars involving team oral discussions
- Homework assignments
- Self-study of presentation
- Self-study of recommended literature

Course lecturer is advised to use interactive learning methods, which allow participation of the students, such as discussions. It is also expected that multimedia presentations and video materials will be intensively used for the study process.

Students are required to study the presentations and the recommended reading. Students are required to actively participate in oral discussions during seminars and to take all tests.

## **9. Special Equipment and Software Support (if required)**

The course requires a computer or laptop, projector, and acoustic systems for multimedia presentations and video.