<table>
<tr><td>Course title</td><td colspan="7">Biological Basis of Mental Processes*</td></tr>
<tr><td>Type</td><td colspan="7">20 hours of lectures + 10 hours of seminars = 30 hours</td></tr>
<tr><td>Course leader</td><td colspan="7">Prof. Marija Heffer, PhD</td></tr>
<tr><td>Course co-leader</td><td colspan="7">Prof. Dunja Degmečić, PhD
Assoc. Prof. Senka Blažetić, PhD
Assoc. Prof. Irena Labak, PhD</td></tr>
<tr><td>The goal or purpose of the course</td><td colspan="7">The aim of the course is to make a connection between the anatomical structure and biological processes that are the basis for the functioning of the central and peripheral nervous systems and their healthy or pathological expression that manifests itself through sensation, motor skills, and mental processes.</td></tr>
<tr><td>Prerequisites for enrolment</td><td colspan="7">No prerequisites</td></tr>
<tr><td>Learning outcomes</td><td colspan="7">After successfully completing the course, the student will be able to:
Describe the structure and function of individual parts of the central, peripheral, and autonomic nervous systems and explain the principles of mutual communication between neurons;
List the systems that participate in the perception of sensations and movement control, and recognize how they are used in modern biotechnology;
Relate the role of the autonomic nervous and neuroendocrine systems with the long-term consequences of the stress response;
Explain the basis of addiction, its consequences, and the success of therapy;
Explain the biological basis of learning and memory, connect it with the attention system and critical periods in brain development, and the role of sleep in regenerative and cognitive processes;
Connect the consequences of brain injury with speech and motor disorders and explain the consequences of trauma and the possibilities of brain regeneration;
Distinguish the role of neurodevelopmental processes in relation to the influence of environmental factors in shaping healthy sexuality;
Connect the maturation of emotions with the development of social cognition;
Connect lifestyle and the influence of nutrition with brain development and aging;
Evaluate the benefits that come from modern neuroscientific biotechnology and create a critical opinion about potential dangers.</td></tr>
<tr><td rowspan="3">The relation between learning outcomes, teaching methods, and assessment</td><td>Teaching activity</td><td>ECTS</td><td>Learning outcome</td><td>Student activity</td><td>Methods of assessment</td><td colspan="2">Points</td></tr>
<tr><td></td><td></td><td></td><td></td><td></td><td>min</td><td>max</td></tr>
<tr><td>Teaching based on a motivating teaching process</td><td>1</td><td>1-10</td><td>Attendance at classes with active participation

(understanding, recognizing, connecting)</td><td>Records of monitoring students and their active participation

Discussion</td><td>10</td><td>20</td></tr>
<tr><td>Writing a seminar</td><td>1</td><td>1-10</td><td>Writing seminar

(demonstrating the adoption of the application of teaching guidelines by identifying the observed problems)</td><td>Critical Analysis</td><td>20</td><td>40</td></tr>
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	Final exam	2	1-10	Revision of the acquired material Analyzing and synthesizing facts that create awareness of the known boundaries of the field of learning, and their evaluation	Oral exam Evaluation	30	40
	Total:	4				60	100
Office hours	Consultation time with prior notice by email: *mheffer@mefos.hr, ddegmecic@gmail.com*						
Acquired competences	After completing the course, the student is expected to identify the biological basis of neurological and mental manifestations.						
Content	The brain is an organ that controls all bodily functions: heart rate, breathing, digestion, immune system, kidneys, reproduction... It consists of two basic cell types: neurons (cells that communicate with each other via electrical and chemical signals) and glia (cells that support neurons). It is most sensitive to external influences during development (drugs, toxins, addictive substances, etc.). Maturity is achieved relatively late, after mastering complex social skills; in humans, this is in the mid-twenties. The acquisition of complex cognitive functions, such as language, mathematical rules, social norms, morality, and ethics – is the result of long-term training. Neurodevelopmental disorders affect men more than women because many developmentally key genes are located on the X chromosome. Conversely, women suffer more often from emotional disorders, and they have a higher incidence after adolescence and arise under the influence of numerous external factors – especially stress and emotional trauma. Damage associated with the loss of parts of the neural network due to trauma, hemorrhage, hypoxia, or metabolic deficiencies has a characteristic clinical picture. The brain has a low ability to regenerate, so once lost neurons are very rarely replaced with functional cells. Brain health is related to the health of all other organs, which is why, for example, diseases of the digestive system, kidneys, or liver can affect cognitive processes. Premature dementia, Alzheimer's disease, is considered the diabetes of the brain. Physical health cannot be considered without mental and spiritual health. <u>Lectures</u> Types of cells in the nervous system and their function – who helps whom? Neurotransmitter systems – why is depression serotonin, and addictions dopamine? Basics of human brain development with critical periods – when should we train what? Anatomical structure of the brain and spinal cord – separate neural networks or a plastic whole? Principles of the structure of sensory systems using the example of touch and pain; Vision – interpretation and illusion of the world; Hearing – the main sense of social interaction; Sense of balance – an indicator of aging; Smell and taste – the realm of hedonic pleasures; Movement – integration of sensations and motor functions – how do robots walk? Autonomic nervous system and neuroendocrine functions – why do we need a stress response? Addictions – when are we too late for rehabilitation? Healthy sleep – a prerequisite for cognitive health; Learning and memory – the achievements of genetics and the benefits of training; Speech and language – what language do you speak? Sexuality – what is given at birth, and what is shaped by growing up; Aging and neurodegenerative diseases – one is inevitable, and the other? Gene diagnostics and therapy – promise or threat? Applied neuroscience and social progress; Does free will exist?							
Required reading	D. PURVES i sur., *Neuroznanost*, Zagreb, 2016. (hrvatski prijevod 5. izdanja, gl. ur. Marija Heffer)						

	Grupa autora, *Spoznaje o mozgu – Početnica o mozgu i živčanom sustavu*, Osijek (izdanje u pripremi za 2021. godinu)
Recommended reading	B. J. BAARS, N. M. GAGE, *Cognition, Brain and Consciousness. Introduction to Cognitive Science*, Amsterdam/Paris, 2010. R. M. SAPOLSKY, *Behave, New York*, 2018. R. M. SAPOLSKY, *Why Zebras Don't Get Ulcers*, New York, 1994. R. M. SAPOLSKY, *Determined: The Science of Life Without Free Will* (U pripremi izdanje za 2022.)
Teaching methods	Lectures accompanied by PowerPoint presentations, examples from psychiatric practice, and a flipped classroom.
Methods of knowledge assessment and examination	Written report, oral exam.
Language of instruction and opportunities	Croatian
Method of monitoring the quality and success of each course and/or module	Questionnaire on the quality of teaching. Regular monitoring of understanding of the material with a questionnaire on key concepts and principles.