

COURSE OUTLINE

(1) GENERAL

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| SCHOOL | Medical School | | |
| ACADEMIC UNIT | Medical School | | |
| LEVEL OF STUDIES | Postgraduate | | |
| COURSE CODE | NEURO 102 | SEMESTER | 1 |
| COURSE TITLE | Systemic Neuroscience | | |
| INDEPENDENT TEACHING ACTIVITIES <i>if credits are awarded for separate components of the course, e.g. lectures, laboratory exercises, etc. If the credits are awarded for the whole of the course, give the weekly teaching hours and the total credits</i> | | WEEKLY TEACHING HOURS | CREDITS |
| Lectures | | Four hours/week, 7 weeks | 8 |
| <i>Add rows if necessary. The organisation of teaching and the teaching methods used are described in detail at (d).</i> | | | |
| COURSE TYPE <i>general background, special background, specialised general knowledge, skills development</i> | <i>specialised general knowledge,</i> | | |
| PREREQUISITE COURSES: | NONE | | |
| LANGUAGE OF INSTRUCTION and EXAMINATIONS: | English | | |
| IS THE COURSE OFFERED TO ERASMUS STUDENTS | Yes | | |
| COURSE WEBSITE (URL) | | | |

(2) LEARNING OUTCOMES

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| <p>Learning outcomes <i>The course learning outcomes, specific knowledge, skills and competences of an appropriate level, which the students will acquire with the successful completion of the course are described.</i></p> <p><i>Consult Appendix A</i></p> <ul style="list-style-type: none"> • <i>Description of the level of learning outcomes for each qualifications cycle, according to the Qualifications Framework of the European Higher Education Area</i> • <i>Descriptors for Levels 6, 7 & 8 of the European Qualifications Framework for Lifelong Learning and Appendix B</i> • <i>Guidelines for writing Learning Outcomes</i> |
| <p>Acquisition of basic knowledge on (a) the principles of CNS organization (hierarchical, horizontal, modular) at the microscopic and macroscopic levels, (b) the neuronal circuits supporting basic sensory and motor functions, and (c) neuronal processes that take place in specific cortical regions and within functional networks enabling complex psychological functions.</p> <p>Familiarization with current methods to study anatomy and function of the CNS in relation to specific psychological functions and disorders. In this manner students learn to apply specific techniques to study brain function at the systems and network level as they become involved in specific cognitive and emotional functions.</p> <p>Be able to synthesize old and new data from several study modalities in the quest for pervasive questions regarding the manifestations and components of key psychological functions.</p> <p>Develop critical thinking in evaluating old and new experimental data and clinical findings regarding the association of the brain with behaviors and psychological phenomena,</p> |

emphasizing the inherent limitations of current approaches.

General Competences

Taking into consideration the general competences that the degree-holder must acquire (as these appear in the Diploma Supplement and appear below), at which of the following does the course aim?

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| <i>Search for, analysis and synthesis of data and information, with the use of the necessary technology</i> | <i>Project planning and management</i> |
| <i>Adapting to new situations</i> | <i>Respect for difference and multiculturalism</i> |
| <i>Decision-making</i> | <i>Respect for the natural environment</i> |
| <i>Working independently</i> | <i>Showing social, professional and ethical responsibility and sensitivity to gender issues</i> |
| <i>Team work</i> | <i>Criticism and self-criticism</i> |
| <i>Working in an international environment</i> | <i>Production of free, creative and inductive thinking</i> |
| <i>Working in an interdisciplinary environment</i> | |
| <i>Production of new research ideas</i> | <i>Others...</i> |
| | |

Great emphasis is placed on grasping the inherent complexities of psychological functions, processes and manifestations (behaviors, cognitive abilities, and psychophysiological responses) in human as a basis for designing appropriate experimental studies to study corresponding brain mechanisms.

Critical, independent thinking is systematically encouraged toward evaluating the results of relevant studies using invasive techniques (lesion/volumetry, electrocortical stimulation and recordings) and neuroimaging. The students should become aware of crucial limitations of existing approaches in elucidating the mechanisms responsible for such complex functions are discuss and be able to consider future advances.

Strategic planning and decision making are promoted to focus on the most relevant information provided in the study materials and ensure adequate long-term consolidation of knowledge according to the highly diverse backgrounds of students.

(3) SYLLABUS

The course covers in 12 lectures and tutorials basic principles and data regarding the organization of the neural circuits that support sensory, motor, and cognitive functions. Specific topics include the structure and functional organization of the sensory systems (visual, auditory, somatosensory, olfactory, gustatory), the systems involved in motor control (neuromuscular junction, spinal, oculomotor, cerebellar, striatal, and cortical circuits), the systems responsible for sleep, wakefulness, and reward, as well as the brain mechanisms that mediate linguistic, mnemonic, emotional, and executive functions. Specific topics are listed below

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| Basic principles of CNS organization | I. Zaganas ¹ |
| Basic senses and sensory systems: auditory and somatosensory | I. Zaganas |
| Basic senses and sensory systems: visual, olfactory and gustatory | I. Zaganas |
| Motor control (spinal and neuromuscular mechanisms, central mechanisms, oculomotor system) | I. Zaganas |
| Systems responsible for executive functions | P. Simos ² |
| Systems responsible for language functions | P. Simos |
| Systems responsible for memory functions | P. Simos |
| Mechanisms responsible for reward and reinforcement | G. Panagis ³ |
| Systems responsible for the emotions | P. Simos |
| Hemispheric asymmetries and lateralization of functions | P. Simos |
| Review & Tutorial | E. Kavroulakis ⁴ |

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| Review & Tutorial | E. Kavroulakis |
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¹Associate Professor of Neurology, UoC Medical School, ²Professor of Developmental Neuropsychology, UoC Medical School, Professor of Biological Psychology, UoC Department of Psychology, ⁴Post-doctoral researcher, MRI unit, Heraklion University Hospital.

(4) TEACHING and LEARNING METHODS - EVALUATION

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| DELIVERY <i>Face-to-face, Distance learning, etc.</i> | Face-to-face | |
| USE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY <i>Use of ICT in teaching, laboratory education, communication with students</i> | Visual aids detailing main points and human brain anatomy essentials (through power point) | |
| TEACHING METHODS <i>The manner and methods of teaching are described in detail.</i> <i>Lectures, seminars, laboratory practice, fieldwork, study and analysis of bibliography, tutorials, placements, clinical practice, art workshop, interactive teaching, educational visits, project, essay writing, artistic creativity, etc.</i> <i>The student's study hours for each learning activity are given as well as the hours of non-directed study according to the principles of the ECTS</i> | Activity | Semester workload |
| | lectures | 20 hours |
| | tutorials | 5 hours |
| | Non-directed study | 175 |
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| | Course total | 203 |
| STUDENT PERFORMANCE EVALUATION <i>Description of the evaluation procedure</i> <i>Language of evaluation, methods of evaluation, summative or conclusive, multiple choice questionnaires, short-answer questions, open-ended questions, problem solving, written work, essay/report, oral examination, public presentation, laboratory work, clinical examination of patient, art interpretation, other</i> <i>Specifically-defined evaluation criteria are given, and if and where they are accessible to students.</i> | Final written exam through open questions requiring short answers | |

(5) ATTACHED BIBLIOGRAPHY

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| <p><u>Basic textbook</u></p> <p>Kandel ER, Schwartz JH & Jessel TM, Siegelbaum, SA, Hudspeth AJ. Principles of Neural Science, 5th ed, New York, McGraw Hill, 2013.</p> <p><u>Supporting study materials</u></p> <p>Miller, B.L. & Cummings, J.L. Human Frontal Lobes, 3rd Edition. NY, Guilford, 2018.</p> <p>Baker CM, Burks JD, Briggs RG, Conner AK, Glenn CA, Sali G, McCoy TM, Battiste JD, O'Donoghue DL, Sughrue ME. (2018). A Connectomic Atlas of the Human Cerebrum. Oper Neurosurg (Hagerstown), 15(suppl_1), S1-S480.</p> <p>Rolls, ET. (2015). Limbic systems for emotion and memory, but no single limbic system. Cortex, 62, 119-157.</p> <p>A.C. Papanicolaou, The Amnesias: A clinical textbook of the disorders of memory and their neurophysiological causes. Oxford University Press.</p> |
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